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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 33009 - 33521.

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AIR POLLUTION ABSTRACTS

33009-33521

FEBRUARY 1974

U.S. ENVIRONMENTAL PROTECTION AGENCY
Assistant Administrator for Air and Water Programs
Office of Air Quality Planning and Standards
Control Programs Development Division
Research Triangle Park, N. C. 27711

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AIR POLLUTION ABSTRACTS

VOLUME 5, NO. 2 FEBRUARY 1974

Prepared by
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Research Triangle Park, North Carolina 27711

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work.

More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Acknowledgement is given to the Technical Publications Branch, Informational Services Division, Office of Administration, Research Triangle Park, N.C. for the make-up of the cover and for arrangement of printing and distribution.

Feedback from our users, including suggestions of articles, are always welcome.

APTIC Publications

Air Pollution Aspects of Emission Sources: Primary Lead Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:126, $0.65.

Air pollution Aspects of Emission Sources: Primary Copper Production - A Bibliography with Abstracts, June 1973 GPO No. EP 4.9:125, $0.70.

Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography with Abstracts, March 1973, GPO No. EP 4.9:121, $2.35.

Air Pollution Aspects of Emission Sources: Primary Aluminum Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:119, $0.90.

Mercury and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:114, $1.25.

Odors and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:113, $3.00.

Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts, July 1972, GPO No. EP 4.9:110, $1.25.

Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:107, $1.00.

Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:105, $2.00.

Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

Chlorine and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:99, $0.55.

Air Pollution Aspects of Emission Sources: Electric Power Production - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:96, $2.25.

Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:95, $0.50.

Air Pollution Aspects of Emission Sources: Sulfuric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:94, $0.65.

Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:93, $0.45.

Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:92, $1.00.

Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes), March 1971, GPO No. EP 4.9:88, $6.25.

Beryllium and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:83, $0.40.

Asbestos and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:82, $0.50.

Municipal Incineration: A Review of Literature, June 1971, GPO No. EP 4.9:79, $1.00.

Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes), October 1970, GPO No. HE 20.1309:75, $5.00.

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from the

Durham Contract Operations
Contracts Management Division, EPA

Contract No. 68-02-1391, RFP No. Du-73-A246 .... *$63,000*
CONSOLIDATION AND PROGRAM DESIGN FOR SAROAD, NEDS AND SIP SYSTEMS.
MITRE Corporation, Westgate Research Park, McLean, Virginia 22101

Contract No. 68-02-1007, TO No. 3, Du-73-A617 .... *$29,615*
DATA COLLECTION FOR THE NEDS SOURCE TEST DATA SYSTEM (SOTDAT).
TRW, Inc., TRW Systems Group, 7600 Colshire Drive, McLean, Virginia 22101

Contract No. 68-02-1376, TO No. 2, Du-74-A053 .... *$32,500*
VALIDATION STUDY OF AN APPROACH FOR EVALUATING THE IMPACT OF A SHOPPING CENTER ON AMBIENT CO CONCENTRATION.
GCA Technology Division, A Division of GCA Corporation, Burlington Road, Bedford, Massachusetts 01730

Contract No. 68-02-1376, TO No. 1, RFP Du-73-A613.................................... *$75,000*
REGIONAL AIR QUALITY INVENTORY EPA REGIONS V, VI, VII.
GCA Corporation, GCA Technology Division, Bedford, Massachusetts 01730

Contract No. 68-02-1271, RFP No. Du-74-B363 .... *$363,000*
EPIDEMIOLOGIC STUDIES PROGRAM.
Colorado State University, Institute of Rural Environmental Health, Department of Microbiology, Fort Collins, Colorado 80521

Contract No. 68-02-1580, RFP Du-74-C690... *$40,000*
NEUTRON ACTIVATION ANALYSIS RESEARCH.
North Carolina State University, Box 5636, Raleigh, North Carolina 27607

Contract No. 68-02-1376, TO No. 4, RFP Du-74-A063.................................... *$50,000*
DEVELOPMENT OF TRAFFIC CONTROL STRATEGIES FOR METROPOLITAN CHICAGO AQCR.
GCA Corporation, Bedford, Massachusetts 01730

Contract No. 68-02-0630, ... *$197,000*
SMOKELESS COKE PUSHING DEMONSTRATION.
Ford Motor Company, Steel Division, 3001 Miller Road, Dearborn, Michigan 48121

BOA Contract No. 68-02-1378, TO No. 1, RFP No. Du-73-A611.................... *$60,000*
REGIONAL AIR QUALITY INVENTORY FOR REGIONS VIII, IX, AND X.
Pacific Environmental Services, Inc., 2932 Wilshire Blvd., Suite 202, Santa Monica, California 90403

Contract No. 68-02-1577, RFP Du-74-C687 .... *$32,929*
AIR CONDITIONING SYSTEM.
Newcomb & Company, 725 Pershing Road, Raleigh, North Carolina 27608

BOA Contract No. 68-02-1377, TO No. 1 Du-73-A612 .... *$70,000*
REGIONAL AIR QUALITY INVENTORY FOR REGIONS, I, II, and III.
Walden Research Division, 359 Allston Street, Cambridge, Massachusetts 02139

Contract No. 68-02-1386, TO No. 1, RFP Du-74-A096 .... *$130,000*
PREPARE 10-YEAR AIR QUALITY MAINTENANCE PLAN GUIDELINES.
Research Triangle Institute, P.O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1343, RFP Du-73-A121 .... *$74,362*
FIELD MONITORING AND TECHNICAL SERVICES IN SUPPORT OF AIR POLLUTION ACTIVITIES.
Pedco-Environmental Specialists, Inc., Suite 8, Atkinson Square, Cincinnati, Ohio 45240 (NOTE: Contract contains options in the amount of $173,425)

Contract No. 68-02-1390, RFP Du-73-A121 .... *$24,210*
FIELD MONITORING AND TECHNICAL SERVICES IN SUPPORT OF AIR POLLUTION ACTIVITIES.
Pacific Environmental Services, Inc., 2932 Wilshire Boulevard, Suite 202, Santa Monica, California 90403 (NOTE: Contract contains options in the amount of $169,470)

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1973

33009 **APTIC NO. 55625**

Japanese Society of Public Health

A STUDY ON SUBSTANCES CONTAINED IN CAR EXHAUST GAS -- DETERMINATION OF ALDEHYDES. *(Jidosha haikigasu ni fukumareru busshitsu ni kansuru kenkyu -- arudehido-rui sokutei). Text in Japanese. 44p., March 1973.*

Two test cars and two test fuels containing 32-41% aromatic hydrocarbons were tested with 10-mode and La-4-mode tests. The exhaust was analyzed for carbon monoxide, hydrocarbons, nitrogen oxides, and aldehydes. The 10-mode test gave more HC and less NOx than the La-4 test. The cold start exhausted more HC and CO than the hot start, with little difference for NOx. Aldehyde concentrations were 0.03-0.21 g/km for the MBTH method and 0.07-0.37 g/km for the DNPH method. The LA-4-mode increased the emission weight. The weight of aldehydes was less than 5% of the total weight of hydrocarbons.

33010 **APTIC NO. 55630**

Japan Heat Management Assoc.

A REPORT OF AN INVESTIGATION OF THE ACTUAL CONDITIONS OF AIR POLLUTANTS IN STATIONARY SOURCES. *(Kotei hasseigen ni okeru taiki osen busshitsu hassei no jittai chosa kaiseki hokokusho). Text in Japanese. 74p., March 1973.*

Stationary sources for nitrogen oxides and hydrocarbons in Kanto district were studied. The NOx were mainly emitted from electric power plants, sintering, and glass melting furnaces. Most HC were emitted by sintering and coke furnaces. Nitrogen oxides were generally emitted by burner combustion, and hydrocarbons were emitted from kilns, furnaces, and smelting furnaces. Hydrocarbon concentrations were only 0.8% of the NOx concentrations. Nitrogen oxide concentrations increase with increasing temperature.

33011 **APTIC NO. 55684**

Bitterlich, Eberhard

LARGE OIL AND GAS-FIRED STEAM BOILERS. *(Grosse oel- und gasgefeuerte Dampferzeuger). Text in German. Brennstoff- Waerme-Kraft, 25(10):371-377, Oct. 1973. 4 refs.*

Contrary to soft and hard coal-fired steam boilers oil- and gas-fired steam boilers are suitable for capacities of 1200 MW and more because of their relative simplicity and their higher energy conversion density in combination with a relatively simple fuel supply. The design of the combustion chamber, the processes such as pressure fluctuations, chemical reactions influenced by the combustion, and selected constructional problems are discussed. A comparison of various kinds of boilers shows that the modified single-flue boiler has the greatest advantages. For very large capacities, steam boilers with linear counterflow firing have the advantage that the reactions at the individual burner can be best controlled with regard to obtaining minimum sulfur oxide and nitrogen oxide concentrations. With tangential firing this is feasible to a limited extent only. It is nowadays feasible to operate 1200 MW boilers without increasing the formation of SOx and NOx.

33012 **APTIC NO. 55633**

Chironis, Nicholas P.

DIESELS A GIANT STEP UNDERGROUND. *Coal Age, 78(3):60-64, March 1973.*

Trends in diesel engine design, safe limits of diesel emission, reports on the use of diesels in underground coal mines, and descriptions of new instruments for monitoring diesel exhausts were discussed at a symposium sponsored by the U. S. Bureau of Mines. The prechamber diesel was stressed. It gives lower emissions than the direct ignition diesel, and turbocharger/aftercooler systems to reduce the size of diesel engines for mining applications. Among physiological effects and thresholds limits of diesel emissions emphasized were the dangers of carbon monoxide, nitrogen dioxide, and sulfur dioxide. Two years experience with diesel haulage equipment in underground coal mining indicates that such equipment is safer than either cable powered or battery powered equipment.

33013 **APTIC NO. 55601**

Fumarola, Giuseppe and Rosanna Gardi

CURRENT TECHNICAL AND ECOLOGICAL PROBLEMS OF SECONDARY AIR POLLUTANTS. *(Attuali problemi tecnici ed ecologici connessi con gli inquinamenti atmosferici secondari). Text in Italian. Inquinamento, 15(5):16-21, June 1973. 24 refs.*

Sources of emission, abatement and control, and maximal permissible secondary pollutant emission levels in force in different countries are reviewed. Included are chlorine, fluorine, hydrochloric acid, hydrofluoric acid, and silicon tetrafluoride, pollutants created primarily localized pollution of relatively short duration. Damage caused to vegetation is primarily chlorosis or loss of chlorophyll; fluorine causes in domestic animals fluorosis or abnormal bone growth. The primary emission sources are chlorine and soda producing plants; hydrochloric acid producing plants; combustion of coal and oil; refuse incinerators; plants producing hydrofluoric acid, phosphoric acid, and phosphate fertilizers; and incinerators burning plastic refuse. Control includes dilution by high stacks, removal of chlorine and fluorine compounds from flue gases by absorption, adsorption, chemical reactions or condensation, or change of process. Most frequently employed is scrubbing with water in venturi towers and absorption by alkaline solutions. Maximal permissible concentrations in different countries differ widely which is not only a reflection of different technological control methods, but also of uncertainty about the toxic effects of the pollutants in question. Many standards are based on maximal allowable concentrations adopted by the American Conference of Governmental Industrial Hygienists.

33014 **APTIC NO. 55764**

Jaske, R. T.

SOLVING THE PROBLEMS OF THERMAL EFFECTS AND OUTPUTS. *Preprint, 14p., 1973. 11 refs. (Presented at the International Pollution Engineering Congress, Philadelphia, Pa., Oct. 22-25, 1973.)*

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The integrated role of energy in relation to environmental practices is discussed. All energy produced and consumed is converted to thermal modification and potential pollution of the environment, irrespective of the efficiency of the conversion or the cascading of the uses of waste heat for a number of useful purposes. Because of the basic laws of thermodynamics, there is no treatment for heat pollution. Any efforts to concentrate it simply requires more mechanical energy which means more waste heat is generated at the power plants. Other types of environmental pollution can be alleviated by various processes which usually consume power and ultimately produce waste heat. Heat is the ultimate residual of society's activities. Urban heat islands increase pollution compared to rural environs of dust by 10 times, sulfur dioxide by five times, carbon dioxide by 10 times, and carbon monoxide by 25 times or more.

33015 **APTIC NO. 55438**

Jocelyn, B. E., J. F. Leach, and P. Wardman

THE EFFECT OF GROWTH IN STRATOSPHERIC FLIGHT OPERATIONS. *Water, Air, Soil Pollut., 2(2):141-153, 1973. 23 refs.*

Aircraft emissions in the stratosphere from all types of aircraft are estimated. Aircraft route frequencies on those routes where aircraft routinely fly above the tropopause were analyzed and included the North Altantic area, U. S. domestic traffic, and transpolar routes. The fuel burned per year above the tropopause since 1960 is estimated. Predictions to 1990 incorporate the increasing numbers of high flying, wide bodied subsonic aircraft, and the introduction of the civil supersonic transport. It is suggested that by 1990, within the rather large uncertainties inherent in these predictions, about 40% of the total fuel burned in the stratosphere could be by civil supersonic aircraft. Nitrogen oxides emissions by civil supersonic aircraft in the stratosphere are estimated to be about 50% of the total by 1990, but because of the higher cruise altitudes of the supersonic fleet, the contribution from this source of the overall effects of these pollutants will be greater than that from subsonic aircraft. (Author abstract modified)

33016 **APTIC NO. 55607**

Jordan, A. Raymond, Mason Willrich, John J. Schanz, Raymond L. Lowrie, and John D. Haun

FOSSIL ENERGY. *Ann. N. Y. Acad. Sci., vol. 216:63-78, May 18, 1973. 4 refs.*

A review of the environmental impact of the entire process of fossil energy production is presented to survey the efforts made through public policy to achieve a satisfactory quality of life. A perspective of the influence of past practices and structures and public policy is presented, along with a survey of existing policies regarding energy from fossil fuels. Environmental problems related to the use of coal for energy production are discussed in terms of general controls, health and safety, acid mine waters, waste materials, reclamation at surface mines, subsidence, and air pollution. A discussion of energy production using oil from shales and tar sands follows. Energy production using oil and natural gas is considered from the point of view of imports versus domestic production, costs, alternative energy sources, effective regulation, and resources. A multidisciplinary research approach to decision-making and policy formulation on some of the problems presented is needed. It is concluded that the present energy shortage stems from economic factors and from pollution problems rather than from a lack of resources, which should last well into the 21st century. A tabulation of some laws and major actions relating to fossil energy and the environment is appended.

33017 **APTIC NO. 55450**

Jungers, Robert H., Robert E. Lee, Jr., and Darryl J. von Lehmden

THE EPA NATIONAL FUELS SURVEILLANCE NETWORK. I: TRACE CONSTITUENTS IN GASOLINE AND COMMERCIAL GASOLINE FUEL ADDITIVES. *Preprint, American Chemical Society, 18p., 1973. 22 refs. (Presented at the American Chemical Society National Meeting, 166th, Chicago, Ill., Aug. 1973.)*

A summary of trace elemental constituents in over 50 gasoline samples and 18 commercially marketed consumer purchased gasoline additives is presented, based on the tabulation of gasoline and other fuels from 10 Regional Offices of the Environmental Protection Agency by the National Fuels Surveillance Network. Analyses indicated the presence of biologically toxic metallic elements such as lead, cadmium, arsenic, vanadium, nickel, and chromium, as well as many other trace elemental constituents. Such elements are of concern because of the potential widespread dissemination of these constituents, most in the respirable range and at ground level. Another concern is the presence of detected constituents such as sulfur which may poison exhaust catalytic devices now under development. It appears that a portion of these trace constituents found in gasoline is introduced in fuel additives or is extracted from the transport and storage system.

33018 **APTIC NO. 55690**

Mitrega, Jan

THE FUEL AND ENERGY BASIS OF THE PEOPLE'S REPUBLIC OF POLAND TODAY AND IN THE YEAR 2000. *(Die Brennstoff- und Energiebasis der Volksrepublik Polen heute und im Jahre 2000). Text in German. Neue Bergbautech., 3(9):637-641, Sept. 1973.*

The prognosis of the growth of the primary energy demand in Poland forecasts a doubling within the period 1970 to 1985 and a further increase by more than 60% in the following 15-year period. Hard coal mining is planned to go up from 140 million tons in the year 1970 to 215 million tons in the year 1985 and to about 300 million tons in the year 2000. Of these figures, 35 to 40 million tons annually are assigned for export. The present rate of soft coal mining shall be doubled and tripled. Gaseous fuels will be increasingly used. By 2000 they shall still be 30% of the fuel demand. Nuclear power will be introduced by 1980. The increasing environmental pollution paralleling the growing power consumption shall be met by the erection of high stacks and the installation of waste gas cleaning facilities. Furthermore, highly efficient dust collectors shall help to reduce the dust emission, and low-sulfur coal shall be stored for use during inversion weather. An air monitoring systems for the sulfur concentration shall help to detect any excessive concentrations immediately. The development of coal and waste gas desulfurization processes shall be promoted. All these planned measures shall help to reduce the dust emission which in 1971 amounted to 2,530,000 tons and the waste gas emission which reached 1,820,000 tons in 1971.

33019 **APTIC NO. 55667**

Morita, Yoshiro, Yoshio Sohda, Ken Suzuki, Tatsuo Omata, Kosaku Ohta, and Toyohiko Yamazaki

DRY DISTILLATION AND DECOMPOSITION OF ASPHALTS. *(Asufaruto no kanryu oyobi bunkai). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 52(556):661-668, Aug. 1973.*

In an attempt to obtain low-sulfur fuels from petroleum residues, asphalts were decomposed by dry distillation to yield gases, oil, and coke. The product yield and S distribution were analyzed within a temperature range of 400 to 1000 C. Cracking occurred as a function of rising temperature up to 700 C, with the dehydrogenation of the coke occurring at higher temperatures. The S content of the oil was 2.4 to 3.4% (by weight), with the hydrogen sulfide concentration being 2.0 to 8.0% (by volume) of the gas produced. More than 40% (by weight) of the feed S remained in the coke. The coke was converted to carbon oxides and hydrogen by steam. Calcium oxide, barium carbonate, magnesium oxide, sodium carbonate, and potassium carbonate catalyzed these reactions, and CaO accepted the S. The presence of H2 had little effect on the product yield or S distribution.

33020 **APTIC NO. 55730**

Niemeyer, Dieter

EXHAUST GASES FROM DIESEL FORKLIFTS. *(Abgase beim Einsatz von Diesel-Gabelstaplern). Text in German. Foerdern Heben, 23(12):671-673, 1973. 4 refs.*

The diesel engine is the only engine suitable for installation in forklifts. All other engines are much more difficult to control concerning the exhaust gas emission which is not to exceed the existing limits valid for indoor operation. The special advantage of the diesel engine in comparison to the Otto engine is the low carbon monoxide concentration of the exhausts. At high loads soot develops in the diesel engine through the cracking processes at high temperatures and local lack of air. The soot consists to a large extent of carbon to which small quantities of higher-boiling hydrocarbons adhere. The soot development, which also takes place at the starting process, is enhanced through errors at the injection organs or in the combustion chamber of the engine and is in general a sign for badly maintained or adjusted and overloaded engines. Two methods are available for reducing the pollutant emission for diesel engines installed in forklifts, one aims at a reduction of the absolute quantity of the pollutants emitted with the exhausts, the other at the dilution of the exhausts through sufficient supply of fresh air or intense mixing with air. In the first case engine modifications with the goal of achieving complete combustion are to be preferred over afterburners for diesel engines. At the present state-of-the-art, engines with divided combustion are better than direct injection engines as far as the exhaust gas quality is concerned.

33021 **APTIC NO. [illegible]**

Novick, Robert E.

MAN, HIS ENVIRONMENT AND LEAD. *J. Environ. Health, [illegible]*

A review is presented on the [illegible] and effects of lead in the environment [illegible]

[illegible]

[illegible]

emitted from an areas corresponding to 3.4% of the area of the whole country.

33023 **APTIC NO. 55364**

Sansom, Robert L.

CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND ENGINES. FEDERAL CERTIFICATION TEST RESULTS FOR 1974 MODEL YEAR. *Federal Register, 38(212):30494-30524, Nov. 5, 1973.*

The results of certification tests conducted on new motor vehicles and new motor vehicle engines to determine conformity with Federal standards for the control of air pollution caused by motor vehicles are presented. The emission levels (nitrogen oxides, carbon monoxide, hydrocarbons) are listed for each light duty emission data vehicle and heavy duty emission duty emission data engine, as adjusted by the deterioration factors. The vehicles and engines represent all the models and configurations certified as of Sept. 21, 1973 for the 1974 model year. The emission and fuel economy data was obtained from the original emission data vehicles and engines.

33024 **APTIC NO. 55745**

Schaefer, Helmut

ENERGY TECHNOLOGY AS A MEANS OF SHAPING THE ENVIRONMENT AND AS A FACTOR OF STRESS ON THE ENVIRONMENT. *Kerntechnik, 15(9):403-407, 1973. 1 ref.*

In 1960 the worldwide consumption of primary energy was about 4 times 10 to the 4th power tons coal equivalent. By 1970 the demand for primary energy increased by a factor of 1.75. In the Federal Republic of Germany the consumption of primary energy increased at a rate of 4.5% per year during the period 1960 to 1970. The ecological consequences of the use of energy include the pollution of the atmosphere with solids, liquids, and gases as well as with heat. The pollutant emission per unit of released energy depends not only on the type of fuel used but also, to a very large extent, on the type, size, and mode of operation of the plants in which the fuel is used. The total energy consumption fluctuates seasonally. The highest consumption [illegible] occurs in December, the lowest [illegible] in July. About 72% of the total yearly energy consumption falls in the months from October to April. More than half of the total energy is used for room heating. The seasonal fluctuation of energy demand is paralleled by seasonal fluctuations of the extent of pollutant emissions into the atmosphere. Due to the high increase of energy demand [illegible] the sulfur dioxide emission during the [illegible] as high as during summer. In Munich the [illegible] for the seven cold months from October to April [illegible] that for the five warm months [illegible]. Considered on a global scale thermal pollution is still negligible, but it does affect microclimates [illegible]

[illegible] **APTIC NO. [illegible]**

[illegible]

[illegible] POLLUTION AND URGENCY FOR [illegible] *(Taiki osen to sono [illegible]). Text in Japanese. [illegible] 1973.*

[illegible] Japanese emission inventories, [illegible] are discussed. Nitrogen dioxide [illegible] were above the air quality [illegible] come from raw materials, [illegible] power generation, steel making and [illegible]. Nitrogen oxides were from mining, manufacturing [illegible] and auto exhaust. Tokyo pollution [illegible] especially automobiles (80% of the [illegible] more than half the hydrocarbons, and 40% [illegible] air quality standards, desulfurization, and other [illegible]

33026 **APTIC NO. 55421**

Sigal, I. Ya. and Yu. A. Babenko

TOXIC EMISSIONS IN THE ATMOSPHERE. *(Toksichnyye vybrosy v atmosfere). Text in Russian. Energ. Elektrif., no. 4:6-8, 1973.*

Toxic gaseous and particulate emissions from thermal power plants are surveyed. Fly ash, soot, sulfur dioxide, sulfur trioxide, nitrogen oxides, carbon dioxide, carbon monoxide, and carcinogens such as 3,4-benzopyrene are emitted in combustion processes from boilers in general and from thermal power plants in particular. The SO2 concentration in combustion gases from coal and mazout firing equipment amount to 0.15-0.4%, while the SO3 concentrations makes up 1 to 2% of the SO2 concentration. The nitrogen dioxide and other nitrogen oxides concentrations in flue gases increase with the combustion temperature. The CO concentrations amount to about 0.1%, the aldehyde concentrations to 0.02%, and the organic acid concentrations to 0.001%. The switch from coal or fuel oil firing to natural gas firing results in a considerable decrease in the dust, SO2, and 3,4-benzopyrene concentrations, while it leaves the nitrogen oxide emissions practically unchanged. Electrostatic dust separators reach efficiencies of 98-99%, which, however, do not exceed 93-94% under field conditions. The maximum SO2, NO2, CO, and dust concentrations in the air are limited to 0.5 mg/kg, 0.085 mg/kg, 3 mg/kg, and 0.5 mg/kg in the USSR.

33027 **APTIC NO. 55590**

Tamura, Tetsuomi, Toshio Takishita, Shin Matsuoka, and Takeyuki Kamimoto

STUDY ON NITROGEN OXIDE FORMATION PROCESS IN A SPARK IGNITION ENGINE (1ST REPORT). *(Hibana tenka enjin no NO seiseikatei ni kansuru kenkyu (Dai-ippo)). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, Japan, p. 173-176, 1973. 5 refs. (Presented at the Japan Society of Mechanical Engineers, 51st Meeting, Fukuoka, Japan Oct. 16-17, 1973).*

Nitric oxide formation in a spark ignition engine was studied with infrared luminescence spectroscopy. Hourly changes in NO concentrations were measured at wavelengths from 4.4 to 5.95 micron in order to obtain the emission of NO at 5.3 micron by interpolation. The absorption infrared luminescence spectroscopic method was more accurate than the conventional luminescence method. The NO concentration in the final stage of combustion increased with greater crank angle. Predicition of the NO concentration by new thermodynamics temperature calculations produced values agreeing with those obtained by actual measurements.

33028 **APTIC NO. 55401**

Vero, Jozsef

THE SITUATION OF THE AIR AND WATER POLLUTION CAUSED BY SIDERURGY-, THE TECHNICAL AND ECOMICAL POSSIBILITIES OF ITS PREVENTION. *(A vaskohaszat okozta levego- es vizszennyezes helyzete, a megelozesenek muszaki es gazdasagi lehetosegei). Text in Hungarian. Musz. Tud., 46(3-4):349-362, 1973. 10 refs.*

The situation of the air and water pollution caused by siderurgy and the technical and economical possibilities of its prevention are discussed. The steel production of the world amounts to 600 million tons/yr involving the formation of a smoke quantity greater by one order of magnitude. Hungarian siderurgy has reduced its fuel consumption and smoke by approximately 35% since 1960. In the following years the pollution of the air space of the country will be reduced by the effect of investments. The water household of Hungarian siderurgy is highly developed and requires about 10% of the industrial water needs; 57% of this is fresh water. Approximately 80% of the waste water gets into the recipients in duly cleaned form.

1972

33029 **APTIC NO. 55360**

Bureau Permanent International des Constructeurs d Automobiles

AUTOMOBILES AND ENVIRONMENT. *(Jidosha to kankyo). Text in Japanese. Jidosha Kogyo (Autmob. Ind.), 6(9):3-16, Sept. 1972.*

The advantages and disadvantages of automobiles are discussed. Cars fulfill mans need for transportation and are therefore necessary. Air pollution from automobiles has been overestimated. Of 1000 units of nitric oxide in the air, 930 are naturally produced, 63 are from factories and domestic heating, and 7 are from automobiles. Pollution control devices will reduce automobile pollution greatly in the near future.

33030 **APTIC NO. 55575**

Erdtel, B.

SIMPLIFIED METHOD FOR THE DETERMINATION OF AIR HEATING EFFICIENCY DURING JOINT COMBUSTION OF NATURAL GAS WITH OTHER FUELS. *(Uproshchennaya metodika opredeleniya effektivnosti nagreva vozdukha pri szhiganii prirodnogo gaza sovmestno s drugimi vidami topliva). Text in Russian. Gaz. Prom., 17(4):32-35, 1972. 8 refs.*

Methods anf formulas for the simple determination of the efficiency of air heating during joint combustion of natural gas, other gaseous and liquid hydrocarbons, and coal are given on the basis of fairly stable thermotechnical parameters of the fuels. The air heating efficiency is determined as a function of the enthalpy of the heated air relative to the potential heat of the fuel being used, the dilution factor of the dry combustion products, the heated air temperature, and an averaged correction factor which varies from 0.78 to 0.82 for air temperatures ranging from 100 to 600 C. The general formula is applicable also to the joint combustion of natural gas with coal at dilution factors less than 1.3. Examples for the calculation of the air heating efficiency during joint combustion of natural gas and mazout, and of natural gas with liquefied gas, are given.

33031 **APTIC NO. 55391**

Finneran, J. A. and J. R. LeBlanc

CATALYTIC MANUFACTURE OF SNG. *Gas, 48(3):48-50, March 1972.*

A catalytic process is presented for manufacturing substitute natural gas (SNG) from light hydrocarbons such as LPG or naphtha using technology developed by the British Gas Council and designated the Catalytic Rich Gas (CRG) Process. The process uses as feed stock a straight run hydrocarbon distillate of lower molecular weight which has been desulfurized to avoid poisoning the catalyst with sulfur. It produces gas interchangeable with United States pipeline gas and containing between 98-99% methane, 0.1-1.0% carbon dioxide, less than 0.1% carbon monoxide, and between 0.1 and 1.0% hydrogen. A simplified flow sheet of the process is included.

33032 **APTIC NO. 55407**

Grjotheim, K., H. Kvande, K. Motzfeldt, and B. J. Welch

THE FORMATION AND COMPOSITION OF THE FLUORIDE EMISSIONS FROM ALUMINUM CELLS. *Can. Met. Quart., 11(4):585-599, 1972. 42 refs.*

A survey of information in the literature regarding the total fluoride consumption per ton of aluminum produced in many plants and the amount of fluorides retrieved from the anode gas is presented, and a quantitative calculation is given for the fluoride emissions generated by vaporization from the melt based on data for vapor pressures of sodium fluoride-aluminum fluoride melts with relevant additions. The observed fluoride emission rates are ascribed to three principal mechanisms: vaporization from the molten electrolyte; primary generation of hydrogen fluoride in the cell; and the entrainment of liquid droplets and solid dust. Available evidence indicates that each mechanism is of about equal significance. Possible reactions between the moisture content of the feed and the molten fluorides include hydrolysis reactions in the fluoride melt and partial reduction to hydrogen as a result of introduction of water with the feed. Another source of hydrogen may be the materials of the anode. Part of the hydrogen may be anodically oxidized to hydrogen fluoride which significantly contributes to the total fluoride emission rate. The reactions of water vapor with the fluoride containing melt vapor alter the chemical composition of the emissions but will not contribute to the emission rate. (Author abstract modified)

33033 **APTIC NO. 55465**

Kaiser, Elmer R., Daniel Kasner, and Charles Zimmer

INCINERATION OF BULKY REFUSE III. *American Society of Mechanical Engineers, New York, Proc. Natl. Incinerator Conf., New York, 1972, p. 338-346. (June 4-7.)*

The practical aspects of the design and operation of batch charged furnaces with refractory hearths for incinerating mixed oversized wastes were investigated with special reference to the combustion and air pollution. A procedure is outlined for designing the configuration of combustion chambers, primary and secondary, and for sizing the air ducts, ports, and blowers. By means of mass and heat balances, the volumes of air and flue gas are determined. Details as to refractories, steelwork, doors, roof, and chimney construction are left to design engineers and suppliers. The principles and design factors were derived from tests on full scale furnaces. Several incinerators based on some or all of these principles have been in successful operation for several years. The instrumentation needed is primarily a draft gauge and a pyrometer. Although the emission of fly ash is relatively low, air pollution control equipment will be required to meet the strict, new regulations. Either an electrostatic precipitator or a gas scrubber will serve the purpose. A method is given to calculate the quantity of gas to be cleaned.

33034 **APTIC NO. 55503**

Kiknadze, L. P., M. G. Chkhubianishvili, and A. D. Volkov

INVESTIGATION OF THE DECOMPOSITION OF BLAST FURNACE CHARGE CONTAINING CLCIUM SULFATE, CARBON AND SODIUM HEXAFLUOROSILICATE. *(Issledovaniye razlozheniya shikhty, soderzhshchey sul fat kal tsiya, ugol i kremneftoristyy natriy). Text in Russian. Soobshch. Akad. Nauk Gruz. SSR, 65(2):369-372, 1972. 7 refs.*

The effect of sodium hexafluorosilicate as an accelerating additive on the decomposition of calcium sulfate in mixture with coal in clinker burning operations was studied. Acceleration of the sulfr dioxide formation by 0.5-1.5% of NaSiF6 in a temperature range of 1000-1100 C was determined. The optimum NaSiF6 expenditures at 1000, 1050, and 1100 C were 1.5%; 0.5%, and 1.0%. Evaporation of sodium fluoride at 1100 C was observed. Substantial decrease in the formation of elementary sulfur, and increase in the rate of decomposition of the charge in the presence of NaSiF6 were noted.

33035 **APTIC NO. 55699**

Komukai, T. and T. Noto

ON THE VARIATION OF EXHAUST CO EMISSION AND INDIVIDUAL HYDROCARBON COMPONENTS OF THE AUTOMOTIVE GASOLINE ENGINE UNDER LIGHT RUNNING CONDITIONS. *(Gasorin kikan no mufuka untenji ni okeru haishutsu CO oyobi tanka suiso sosei henka ni tsuite). Text in Japanese. Hokkaido Jidosha Tanki Daigaku Kenkyu Kiyo (Bull-Hokkaido Junior Coll. Automob. Technol.), no. 2:5-13, 1972. 7 refs.*

For years, carburetors have been adjusted to reduce the concentration of carbon monoxide in the exhaust of the gasoline engine, but little consideration has been given to the relationship between the CO concentration and the amount of unburned hydrocarbons. Moreover, some hydrocarbons, particularly olefins, produce photochemical reactions in the atmosphere to form objectionable pollutants. A series of experiments was carried out to determine the quantities of the individual hydrocarbons in exhaust emissions under light running conditions; a gas chromatographic method was employed. Primary consideration is given to the definite tendency for the amount of total unburned hydrocarbons and individual hydrocarbon components in the exhaust to be affected by the CO concentration, the turning of the idling adjuster, and the number of engine rpm.

33036 **APTIC NO. 55579**

Singh, Trilochan and Irven Ball

EFFECT OF LOAD ON THE PARTICULATE EMISSION FROM A SPARK IGNITION ENGINE. *Preprint, Combustion Inst. Pittsburgh, Pa., 27p., 1972. 14 refs. (page 8 unavailable.) (Presented at Combustion Institute, Western States Section Meeting, 1972, Paper WSCI 72-37.)*

The effects of dynamometer loading on the particulate emission from a V-8 spark ignition engine using non leaded fuels under steady conditions were studied. Effects from other factors were minimized by filtering the inlet air, eliminating muffler and tailpipe, and simulating the dynamic effects of exhaust jet by quenching the exhaust jet with a known quality of prefiltered ambient air. Steady state lean operation of a gasoline engine produced about one-tenth of the exhaust particulates found in cyclic mode operation of the vehicle system. The particulate emission rate (g/mi) increased with an increase in load; the mean median diameter decreased with an increase in load. Most of the particulates arigivated from the combustion chamber for non leaded gasoline operation and are formed by vapor phase condensation. (Author conclusions modified)

33037 **APTIC NO. 55700**

Takahashi, T., T. Komukai, M. Kondo, T. Hasebe, T. Noto, and S. Takeda

THE FINDINGS OF A ROAD TEST CONCERNING THE CONCENTRATION OF CO IN THE EXHAUST DURING ACCELERATION (PART 2). *(Rojo shiken ni yoru kasokuji no haishutsu CO ni tsuite (dainiho): daiissoku de no kasoku jotai)). Text in Japanese. Hokkaido Jidosha Tanki Daigaku Kenkyu Kiyo (Bull. Hokkaido Junior Coll. Automob. Technol.), no. 2:15-20, 1972. 4 refs.*

Road test experiments were carried out to determine the effect of the pressure on the accelerator pedal and the condition of the clutch condition on the concentration of carbon monoxide in the engine exhaust. Primary attention was focused on the first stage of acceleration. The results indicate that the CO concentration in the exhaust is subtly influenced by the time during which half clutch is applied and the number of rpm of the clutch connection.

33038 **APTIC NO. 55455**

Watson, R. H. and J. M. Burnett

RECENT DEVELOPMENTS AND OPERATING EXPERIENCE WITH BRITISH INCINERATOR PLANT. *American Society of Mechanical Engineers, New York, Proc. Natl. Incinerator Conf., New York, 1972, p. 155-165. 13 refs. (June 4-7.)*

Recent developments and operating experience with British incinerator plants are discussed. The trend is towards direct incineration of crude refuse with continuous operation. The six different types of grate and associated furnaces have all proved adequate from the combustion point of view although certain adaptations and modifications have been necessary to suit British refuse. Problems include frequent pit fires, failures of cranes and grabs, clinker handling, chokage at hopper mouths and screw conveyors, spray controls, poor performances of magnetic separators, and dust and smell. Gross calorific value is often specified in the range 3500 to 5500 Btu/lb with a mean of 4500, but it has been claimed at Derby that the highest value found in a large number of samples was 4300 Btu/lb. A series of tests are outlined to provide a method for direct measurement using the incinerator as a colorimeter. The heat use is considered for power generation or district heating, or for the combined incineration of refuse and sewage sludge. A pilot scale process for recovery of nonferrous metals is outlined, and the recovery of other materials is discussed. Clean air legislation in Britain has concentrated attention on black smoke, grit, and gaseous pollution, but there is evidence of increased public objection to dense white vapor plumes, even though the grit concentration is acceptable. This may influence future designs to adopt means other than spray towers for dissipating heat, which may significantly affect heat recovery proposals. (Author conclusions modified)

33039 **APTIC NO. 57045**

Yablochkin, V. D., A. M. Popov, E. I Chukhno, Ye. V. Kolchina, A. I. Gorshunova, and V. A. Shchirskaya

A STUDY OF VOLATILE SUBSTANCES RELEASED BY VARIOUS KINDS OF POLYMER MATERIALS. *(Issledovaniye letuchikh veshchestv, vydelyayemykh polimernymi materialami razlichnogo tselevogo naznacheniya). Gigiena i Sanit., no. 37:25-28, Feb. 1972. 4 refs. Translated from Russian, 7p.*

A group of new polymer samples of heat-resistant synthetic fabrics, cables, and adhesive films were tested at 40 C for 10 days and at high temperatures (125-200 C) for 2 hr to determine by gas chromatographic means the volatile products released. The polymer materials were found to release primarily organic solvents and their admixtures at 40 C, with the amount of volatile organic substances in individual samples varying from 3.5-368 mg/kg. Fewest volatile substances were found in cable insulation on a fluoroplastic-4M base, in fabric on acrylonitrile base, and fibers on polysulfonamide base. Adhesives on a polyvinyl siloxane and phenolic silicone resin base were found to contain a large amount of volatile substances. The gas generation produces increased sharply at high temperatures, and thermal oxidative breakdown products such as carbon monoxide, formaldehyde, ammonia, and hydrogen cyanide were found. Polymer materials produced without the use of organic solvents or with low-toxic solvents are recommended.

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1971

33040 **APTIC NO. 55571**

Clarke, A. J.

SULPHUR DIOXIDE: SUMMARY OF A REPORT BY THE TECHNICAL COMMITTEE. *Preprint, National Society for Clean Air, Brighton (England), part 1, p. 1-9, part 2, p. 1-14, 1971. (Presented at the National Society for Clean Air Conference, Folkestone, England, Nov. 2-5, 1971.)*

Sulfur dioxide pollution in Great Britain is reviewed. There has been a steady and substantial decrease in urban SO2 concentrations over the last 15 yr due to a decrease in emissions from low level sources. The general trend of urban SO2 concentration appears to be towards a constant figure of 100 microgram/cu m or less. The low level emissions are less than 20% of the total emissions at all heights. Nearly 5 million tons/yr are emitted through tall industrial and power station chimneys. The essential problem in reducing all SO2 emissions is that the cost/benefit analysis of reduction is impractical. Further research is recommended on a definition of the levels of SO2 concentrations that are harmful to public health, to crops, and in the decay of building materials; establishing the chemical reactions and life history of SO2 emitted to the atmosphere, particularly from high chimneys; the role of ambient SO2 concentrations in the nutrition of crops, and the search for cheaper ways of limiting SO2 emissions.

33041 **APTIC NO. 55638**

Cowheld, Chatten, Jr.

PARTICULATE EMISSIONS AND PROCESS CONDITIONS AT REPRESENTATIVE ALFALFA DEHYDRATING MILLS (FINAL REPORT). *Midwest Research Inst., Kansas City, Mo., Proj. 3538-C, 38p., Oct. 19, 1971. 4 refs.*

Particulate emissions and process conditions were measured at four alfalfa dehydrating mills under both normal and extreme process operating conditions. The objective was to provide a data base for the formation of an effective and economically sound control strategy to be followed by the industry in meeting current and future air pollution control regulations. The alfalfa dehydrating industry faces a significant problem with regard to the reduction of dust emissions from current levels to those specified in a common standard. Dust emissions are difficult to control; particles are fine in size and are carried by large volumes of moist gases. Based on technical and economic considerations, no single add-on unit of available control equipment is well- suited to this application. Further study is needed to determine a more favorable flow design and dust control techniques which can be integrated into the basic process. The proper control of dryer operations will eliminate periods of unusually high dust emissions. (Author summary)

33042 **APTIC NO. 55561**

Delannoy, Georges

THE ACTIVITY OF CHARBONNAGES DE FRANCE. *(Action des Charbonnages de France). Text in French. Pollut. Atmos. (Paris), 13(no. special):22-26, Oct. 1971.*

Problems of air pollution in different sectors of the coal mining industry, and the activity of the Charbonnage de France in the pollution abatement area are surveyed. Silicogenic dust and firedamp constitute the chief pollutants emitted during extraction operations. Dust formation is abated by the use of a water jet, and firedamp is detected by means of modern portable methane detectors. While coal sales in general have experienced a decline for years, sales of degassed coal products have remained steady. The studies currently conducted by the Charbonnage de France are concerned with the effects of sulfur and nitrogen oxides (especially when adsorbed on mineral particles), on the human organism, ventilation techniques, the formation of silicosis and pneumoconiosis, the cleaning of waste gases from gaseous and particulate pollutants, the conditions of the formation of NOx in furnaces, and solid-gas interactions occurring in combustion equipment-generated smoke, and the optimum physiochemical conditions of waste incineration.

33043 **APTIC NO. 55514**

Harmelink, M. D. and W. J. Peck

TRANSPORTATION AIR POLLUTION. *Dept. of Highways, Ontario (Canada), D.H.O. Rept. RR169, 37p., June 1971. 32 refs.*

NTIS: N71-35485

A brief state-of-the-art survey of transportation air pollution is given. The primary types of transportation pollution (hydrocarbons, nitrogen oxides, oxidants, carbon monoxide, sulfur oxides, lead, and particulates) are described, after which methods of measurement are listed, and emission rates for various travel modes (automobiles, diesel trucks and buses, trains, and aircraft) are discussed. The effects of the primary pollutants on mental an physical health, vegetation, and materials are described. Finally, various solutions to the transportation air pollution problem are discussed. These solutions range from automobile emission controls and alternatives to the spark-ignited internal combustion engine, to increasing the use of public transportation, the development of new modes of public transportation, and the and the consideration of air pollution in transportation planning. (Author summary)

33044 **APTIC NO. 55734**

Rassudov, N. S. and S. A. Tsygankov

FORMATION OF SO3 IN THE FLAME OF SULFUR-CONTAINING FUELS. *(Obrazovaniye SO3 v plameni serosoderzhashchego topliva). Text in Russian. Energomashinostroenie (Moscow), no. 11:25-27, Nov. 1971. 7 refs.*

The conditions of sulfur trioxide formation in the flame of sulfur-containing fuels were studied in test equipment in which SO3 was oxidized in a disk-shaped, even-temperature flame of natural gas. The SO3 formation took place within the flame zone due to the presence of excess atomic oxygen at a temperature equaling the flame temperature. Increased thermal load in heat insulated combustion chambers will result in increased rate of SO3 formation due to the increase in the fuel spray temperature. This does not apply, however, to combustion chambers with cooled walls. While SO3 formation is due only to the excess oxygen passing through the flame front, the air admitted outside the combustion zone into the flue gases does not affect the SO3 concentration. The SO3 concentration in the flue gases, and consequently the corrosion hazards, can be reduced by two-stage, low-temperature combustion, using primary air at an air-excess coefficient of 1.0 or less, and by admitting secondary air into the flue gases in a relatively low-temperature zone. In combustion equipment with a forehearth, the secondary air can be admitted at the outlet from the forehearth. In combustion equipment with combustion product recycling, the SO3 formation can be abated by reducing the fuel spray temperature. The rate of SO3 formation in fluidized-bed processes will be negligible. A formula for the determination of the SO3 concentration in flue gases is given for design and routine purposes.

33045 **APTIC NO. 55546**

Sjolin, Knud-Erik

SMOKING - A SOURCE OF LOCAL AIR POLLUTION. *(Tobaksrygning - Naerforurening). Text in Danish. Ugeskr. Laeg., no. 133:2187-2188, Nov. 1971.*

General problems involved in smoking, and approaches to its abatement are discussed. Some 15,000 tons of tobacco are smoked yearly in Denmark, of which about 35% causes particulate air pollution, amounting to an emission of 5300 tons yearly. With one-fifth of the total tobacco being smoked in Copenhagen, the smoking-generated air pollution amounts there to 10 tons/sq km/yr. Smoking in closed locals represents health hazards and a nuisance for smokers and nonsmokers alike. The 3,4-benzopyrene concentration in the noninhaled cigarette smoke is about three times as high as in the inhaled smoke. Some 5000 cases of premature death occur yearly in Demark due to smoking. A relationship between lung cancer incidence and smoking was established.

1969

33046 **APTIC NO. 57088**

EFFECT OF THE FURNACE ON GAS-DUST CONDITIONS, 3. *(Einfluss der Ofenseite auf die Gas-Staub-Verhaltnisse, 3). Preprint, p. 40-52, 1969. 54 refs. Translated from German, 36p.*

The effects of various furnace design parameters are considered in relation to gas-dust conditions. Furnace closure has the greatest effect of the factors considered, but a series of new problems has appeared with the introduction of closed furnaces. The greatest problems are caused by ferrosilicon furnaces in which alloys are smelted having more than 45% silicon. The easily volatilized silicon oxide (SiO) leaving the reaction zone produces reaction products which accumulate to form a flexible white fuzz in the free space under the furnace roof and in the discharge lines. The dust consists mainly of silica. Other problems involve the development of feed hoppers and the determination of new operational requirements for closed furnaces. Various data are given for open and closed furnaces using a variety of materials, for burden compositions, smelting characteristics, heat balance, waste gas composition, and composition of produced materials.

1967

33047 **APTIC NO. 55537**

Thomas, Jerome F.

AIRBORNE SOOT CHARACTERISTICS FROM COMBUSTION. *Preprint, California Univ., Coll. of Engineering Combustion-Generated Air Pollution, 20p., June 1967. 25 refs.*

The characteristics of airborne soot from combustion are detailed in an outline on the forms of carbon. Airborne soots have their origin in black carbon which is a graphite of extremely small crystals. Airborne soot is formed by an adsorption process of carbon smokes and air on a nucleus. Airborne soots originate from power sources and are generally of large diameter, with considerable chain structure, considerable and open channel porosity. A hypothetical presentation of amorphous and crystalline structure of a soot particle is included. The mechanisms of carbon formation during combustion is presented and includes combustion spectrum, a proposed scheme of reactions simultaneously occurring due to individual processes of combustion and theories in carbon formation.

CONTROL METHODS

1973

33048 **APTIC NO. 55582**

DUST COLLECTION - IMPORTANT ELEMENT ON ENVIRONMENTAL PROTECTION. *(Entstaubung - Wichtiges Element des Umweltschutzes). Text in German. Wasser Luft Betrieb, 17(10):355-358, 1973.*

Dust collection is divided into atmospheric dust collection and indoor dust collection. The second type of dust collection is equally important for environmental protection, because it helps to reduce the concentration of the dust going into the atmosphere. A sniffler system is described for monitoring carbon monoxide concentrations in closed rooms. The portable dust collector Portikon has a powerful blower which draws the dust laden air through the aerosol filter. Air conditioners are equipped with filters for dust collection which have a collection efficiency of 95% for particles with a grain size of 3 micron. An air conditioner and airmover are illustrated and briefly described. For indoor dust collection, it is important to know the dust concentration beforehand. For this purpose smoke density meters are available. The operating principle of these units is briefly outlined.

33049 **APTIC NO. 55600**

Research Committee on the Standards of Environment of Grammar Schools and Junior High Schools

INVESTIGATION FOR THE ESTABLISHMENT OF STANDARDS FOR VENTILATION AND AIR CONDITIONING OF GRAMMAR SCHOOLS AND JUNIOR HIGH SCHOOLS. *(Shochugakko kosha no kanki oyobi reidanbo no hyojun sekkei shiryo sakusei no tameno chosa kenkyu). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 11(3):1-67, Aug. 1973. 8 refs.*

Standards for air conditioning apparatuses, ventilation, and environmental control in schools are discussed. Maintenance personnel, maintenance, safety control, air conditioning design, and placement of air conditioners in schools are described. Several examples are given. Costs are cited.

33050 **APTIC NO. 57058**

STEAG, Essen, Germany

BISCHOFF INSTALLATION DEVELOPMENT PROJECT. *(Entwicklungsvorhaben Bischoff-Verfahren). Preprint, March 28, 1973. Translated from German, 10p.*

An interim report on the Bischoff installation development project is presented which includes the installation schedule, operation schedule, breakdowns, scrubber fouling, and work on the installation. Stack gas flow, crude and pure gas dust contents, and desulfurization rates are presented. Scrubber fouling tests after a total of 545 and 688 hr of operation are presented and indicate that even after approximately 700 hr continued operation of the installation is possible without removing the caking. Various installation achievements accomplished during the last two shutdowns are included.

33051 **APTIC NO. 55711**

Akhtarekhavari, Farid

ENERGY FROM THE SUN. REVIVAL OF THE DISCUSSION OF UTILIZING SOLAR ENERGY. *(Energie aus der Sonne, Wiederbelebung der Diskussion un die Nutzung der Sonnenenergie). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 27(45):16-17, Nov. 7, 1973.*

The energy crisis and the escalation of atmospheric pollution by combustion of fossil fuels have rescinded the discussion concerning the use of solar energy. It is still far out of reach and requires enormous sums of money for development. Through intense development, technology and economy of the method could reach a level by 2020 which would permit solar air conditioning of 35% of all buildings in the U. S. as well as replacement of 30% of the gas and 10% of the oil consumption by solar energy. One of the most adventurous projects calls for the use of satellites with solar cells and for conversion in space. The electric power would be transmitted to earth by microwaves. The estimates concerning the costs for development run between 900 million and more than one billion dollars per year for a period of at least 15 years.

33052 **APTIC NO. 55731**

Decker G. and W. Brandstetter

FIRST RESULTS WITH THE VW STRATIFIED CHARGE PROCESS. *(Erste Ergebnisse mit dem VW-Schichtladungsverfahren). Text in German. Motortech. Z. (Stuttgart), 34(10):317-322, Oct. 1973. 10 refs.*

The stratified charge process in automobile engines is based on an ignition and start of the combustion in a fuel-rich zone (lambda smaller than one) and on suppression of the formation of the oxides of nitrogen at high temperatures through mixing of the partially burned charge with a high air surplus (lambda much higher than one). The influence of shapes of combustion chambers on this kind of combustion process was tested. First experiments were conducted with a slightly modified combustion chamber of a VW-1600 cu cm engine. A divided combustion chamber was needed. The experiments eventually led to a combustion chamber with a spherical preliminary combustion chamber which is connected with the main combustion chamber by a relatively large duct. Further experiments were conducted with various arrangements of injection nozzles and spark plug, and the influences of the connecting duct and its size were studied. Graphs showed the measured hydrocarbon and oxides of nitrogen concentration in dependence of the reduced medium pressures at a certain nozzle-plug position for various connecting ducts. While the NOx emissions in the lower load range differed only slightly from each other, a duct with a larger cross section was of advantage for medium pressures above 5.0 bar. Concerning the HC emission, however, a larger duct is a disadvantage. Of the five injection nozzles examined, three were conventional ones operating with different injection pressures, and two produced a very bundled jet. For the HC emission, nozzle no. 1 with the lowest injection pressure produced the best results. Based on these experiments an air-cooled 1600 cu cm engine was built. With it a 75% reduction of the emission of NOx was achieved. The tests are still in progress.

33053 **APTIC NO. 57028**

Dubrovskaya, F. I.

THE EFFECT OF SANITARY-TECHNICAL MEASURES ON THE REDUCTION OF AIR POLLUTION AND THE HEALTH OF THE POPULATION IN THE PRODUCTION OF FAT SUBSTITUTES. *(Vliyaniye sanitarno-tekhnicheskikh meropriyatiy na snizheniye zagryazneniya atmosfernogo vozdukha i zdorov ye naseleniya pri proizvodstve zhirozameniteley). Gigiena i Sanit., 38(2):90-91, Feb. 1973. Translated from Russian, 4p.*

Data on emission reductions of fatty acids, ketones, hydrocarbons, and alcohols are correlated with statistics of upper respiratory diseases in children 8-12 yrs old from the areas affected by the Volga-Don and Shebekino chemical combines for the period 1960- 1969 to illustrate the effectiveness of sanitary-technical measures directed toward reducing emissions in the air. The measures included burning of organic substances contained in emissions, operation of wet scrubbers, sealing of equipment, and increasing the height of stacks. There was a decrease in the diseases of children in these areas following the reduction of air pollutants.

33054 **APTIC NO. 55771**

Eberan-Eberhorst, Robert, Herbert Aibel, and Peter Herzog

THE EFFECTS OF EXHAUST GAS REGULATION ON AIR POLLUTION. THE IMPORTANCE OF LIQUID GAS DRIVES FOR SHORT-DISTANCE TRAFFIC. *(Ueber die Auswirkung von Abgasvorschriften auf die Luftreinhaltung Die Bedeutung des Fluessiggasbetriebes im Nahverkehr). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 115(14): 1118-1125, 1973. 10 refs.*

The effects of exhaust gas decontamination clearly show up in statistics by the Quarterly Progress-Report of the Air Resources Board, California. Although the carbon monoxide emission of the examined automobiles varied greatly, a significant reduction of the average CO emission of the newer models became quite apparent. The average of all American vehicles was still 1.9% CO in 1966, for the model year 1972 only 0.5% was CO. The regulations concerning limitation of exhausts are much more severe in the United States than in the European Community. For the hydrocarbons for instance, the limits are 80 to 186% higher. This gas shall be narrowed down until 1974 to between 15 and 20%. But only a drastic reduction of the pollutant emissions from automobile exhausts will avoid a steady increase with the anticipated linear increase of traffic density. One relatively simple method for drastic reduction of the automobile exhaust gas emissions is operation with a liquid gas. A city bus was modified for liquid gas operation and driving tests on a roller test stand were run with this bus for comparison with a gasoline operated one. With liquid gas operation the CO emission remained below 5 g/HPh (7 g/kWh) with the exception of a narrow range at full load and near idling. The hydrocarbon emission was only half as high as that with gasoline operation. The oxides of nitrogen emissions were higher with gasoline operation in the higher load range. Near 4000 rpm/min and full load, the emission of NOx was lower with gasoline operation because of the rich mixture. With liquid gas a lean mixture was used in this load range which produced a high NOx emission.

33055 **APTIC NO. 55747**

Eickenhorst, H.

HEAT RECOVERY IN VENTILATION SYSTEMS. *(Waermerueckgewinnung in lueftungstechnischen Anlagen). Text in German. Sanit. Heizungstech., 38(9):728-730, 1973.*

Heat recovery from waste air from buildings by the regenerative heat exchanger system Econovent or rotary exchanger is described. A slowly rotating wheel made of heat storing material is inserted into the ventilation system. The outgoing waste air passes one section and the incoming fresh air passes the other section. The waste air yields much of its heat to the heat storing material of the wheel. Through slow rotation of the wheel, the warm section moves to the inflowing air duct where it gives its heat off. This system permits the recovery of 75% of the waste heat. With the recuperative heat exchanger the outgoing and incoming air flow past parallelly arranged glass plates. Since the material is glass, the heat exchanger can also be used for aggressive gases and high temperatures. The degree of efficiency depends on the temperature difference between outgoing and incoming air and permits a reduction of operating costs of about 60%. A recuperative heat exchanger is successfully used in Essen for preheating air in offices. A department store equipped with a heat pump installed for air conditioning and a supplementary oil-fired heating system is unique in West Germany.

33056 **APTIC NO. 55584**

Emi, Jun, Chikao Kanaoka, and Sotogio Aikura

THE PRESSURE DROP CHARACTERISTIC OF POROUS PLATE FILTERS. *(Takobanjo firuta no asson tokusei). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 333-334, 1973. 3 refs. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

A membrane filter can be used to separate fine aerosol particles from air or gases with a high efficiency. It is important to know its pressure drop characteristics. When the thickness of the filter is increased and the pressure drop in the inside cannot be ignored, an equation for the pressure drop in the low Reynolds number area is obtained. When the Reynolds number is greater than 3000, the value of the resistance factor is increased because the velocity of air passing through the pores is close to the velocity of sound. In the area of Reynolds numbers between 300 and 3000, the data shows almost definite values, indicating the smaller the void, the greater the resistance. When the Reynolds number is smaller, the difference due to the void is reduced. When Reynolds is less than 10, the inclination of the resistance factor shows -1, and as the value of the thickness of the filter divided by the diameter of the pores increases, the resistance factor increases.

33057 **APTIC NO. 55619**

Emi, Jun, Chikao Kanaoka, Masatsugu Nomura, and Norio Fukawa

COLLECTION OF AEROSOL PARTICLES BY A SLIT TYPE SCREEN. *(Surittojo sukurin ni yoru earozoru ryushi no hoshu). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 331-332, 1973. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

Because the slit type screen is in close harmony with the theoretical model in the geometrical shape, it is important as the basis for the estimation of the dust collecting efficiency of the usual lattice type screen filter, or for conducting a fundamental study on the collection of aerosol particles. The flow around the ribbon of the slit type screen by making out the Naview-Stokes equation using the space rate was obtained theoretically and the inertial screening theoretical effect was calculated to examine the adequacy of the theory. The comparison of the experimental values obtained when the space rate was 0.8 and 0.5 with the theoretical value obtained using a space rate of 0.5, together with the isolated line, revealed that as the space rate is smaller, the efficiency goes up, showing that the coherent effect is in the direction of plus. In the future, the adequacy of the theory will be studied with respect to space rate and ribbon width, as well as a method of estimating the efficiency of the lattice-shaped screen by taking the effect of crossing into consideration.

33058 **APTIC NO. 55631**

Ende, Gustav

THE PROFITABLENESS OF HEAT RECOVERY SYSTEMS. *(Die Rentabilitaet von Waermerueckgewinnungsanlagen). Text in German. Sanit. Heizungstech., 38(9):731-739, 1973. 13 refs.*

Recuperative and regenerative heat exchangers are described and compared with each other. The recuperative heat exchanger has a high reliability because of the absence of moving parts. Since it is made of glass it is immune to aggressive gases. There is no danger of bacteria transfer. It has a noise abating effect and is easy to maintain. The heavy weight and the sensitivity to extreme pressure and temperature differences are disadvantages. For the regenerative heat exchanger Econovent the storage material is made of finely corrugated non-flammable asbestos sheets of thicknesses from 0.12 to 0.15 mm. The sheets are soaked with a lithium highly hygroscopic salt which serves for the transfer of humidity. The air moves through the 2 mm wide capillary channels in linear flow. The efficiency of heat and temperature exchange depends on the air throughput and may reach 65 to 93%. The savings of energy and operating costs with the Econovent heat exchanger are shown by a numerical example.

33059 **APTIC NO. 55634**

Feckler, Walter

AIR CONDITIONING AND DUST COLLECTION ON A TWO-STAGE FULL CUT DRIVING GALLEY. *(Klimatisierung und Entstaubung an einer zweistufigen Vollschnittmaschine). Text in German. Glueckauf (Essen), 109(20):983-989, Sept. 27, 1973. 4 refs.*

The air conditioning and dust collection system installed on a powerful two-stage driving galley for a mine in West Germany are described. In this case, dust has to be drawn off from two drilling heads alternately, from the pilot drill and the expansion drill. The cyclone dust collector with a nominal capacity of 280 cu m/min was mounted on a trailer. A schematic illustration of the entire dust collection system is given. The length of the dust collector iw 11 m, the weight 2.5 tons. An investigation of the collection efficiency showed that wetting of the collection plates was very important. During occasional drying of the plates, the collection efficiency went from 99.6% to 84.2% by weight. The dust particles collected were to a large extent less than 5 micron in diameter.

33060 **APTIC NO. 55396**

Fife, James A.

SOLID WASTE DISPOSAL: INCINERATION OF PYROLYSIS. *Environ. Sci. Technol., 7(4):308-312, 1973.*

Solid waste disposal by means of incineration versus pyrolysis is reviewed in relation to the efficiency of weight reduction and density of processed waste, resulting air pollutants, and potential by-product recovery, including sources of energy. Starved-air system incinerators are presently capable of meeting the 0.08 g/scf flue gas particulate matter requirement without gas-cleaning equipment, while conventional furnaces require wet scrubbers or electrostatic precipitators with 99% efficiency for compliance. Nitrogen oxide emissions do not occur at normal furnace temperatures when refuse is burned but may be emitted from sewage sludge incineration systems and may also become a problem with slagging systems. Heat recovery equipment may be incorporated into both conventional and slagging incinerator systems and has two associated benefits beyond the potential value of energy recovery itself. First, a minimum volume of flue gas requiring treatment is produced, and the lower flue gas volume passing to the atmosphere results in lower total weight of particulate emission. Secondly, utilization of the recovered heat means that a corresponding quantity of fossil fuel will not be burned, thus reducing emissions. High temperature pyrolysis produces results equal to those obtained from slagging incineration and may in the future accomplish this without use of auxillary fuel by recycling the volatiles and burning them in the primary chamber. Since the process involves combustion in an air-deficient atmosphere, the volume of off-gas is lower than with incineration. The combustible gas would more than likely, however, be burned as fuel or processed for recovery rather than be emitted.

33061 **APTIC NO. 55766**

Fife, J. A.

RECYCLING AND DISPOSAL OF IN-PLANT PRODUCED WASTE. *Preprint, 7p., 1973. (Presented at the International Pollution Engineering Congress, Philadelphia, Pa., Oct. 22-25, 1973.)*

The recycling and disposal of in-plant produced waste is reviewed. The processes available for reducing the volume and/or the weight of solid waste, the methods of transporting it, and the possibilities of recycling are outlined. Elements of solid waste management planning include preparation and storage at points of origin, collection, transportation, processing, and disposition. The economic forces that affect the problem are described through a specific case in which use of the waste fuel produces a real saving. Since the economics of the situation may change, the waste management plan should be frequently reevaluated. The factor of emissions must be included in the evaluation. (Author abstract modified)

33062 **APTIC NO. 55732**

Gauter, Helmut

PROBLEMS ENCOUNTERED IN THE REMOVAL OF DUST FROM STEEL CONVERTER WASTE GASES. *(Zur Problematik der Entstaubung von Konverterabgas). Text in German. Stahl Eisen (Duesseldorf), 93(20):915-920, Sept. 27, 1973. 1 ref.*

The difficulties faced by steel works with dust cleaning facilities are discussed. The plant began operation in 1966. Two converters process low-phosphorus crude iron according to the oxygen lancing process. For cooling converter waste gases to 1100 C, a boiler is installed and is followed by a venturi scrubber which cools the gases to 60 C, while giving them a preliminary cleaning. Through a central tube, the waste gas goes to a wet tube electrostatic precipitator. An axial blower draws off the clean waste gases and blows them into the atmosphere. Modifications of the installations became necessary after unsatisfactory acceptance tests. The installed blower capacity has to be raised from 100 to 120 cu m/sec. The star wires of the ionizing electrodes were replaced by spiral spike wires. With the installation of two additional exhaust tubes, a better gas distribution in the precipitator was achieved. The collection efficiency in the acceptance tests was 99.7%. After a while, replacement of all the collection electrodes became necessary because they were so damaged by corrosion. Through a different arrangement of the tubes, the collection areas were enlarged. The flushing process of the precipitator was also improved to prevent formation of crusts. The dust collection system now separates 93% of the total dust load in the venturi scrubber. The collection efficiency of this unit at the beginning of the blowing action is 98% and then 80%. With both collectors working together, a dust emission of less than 100 mg/cu m can be maintained. A possible explanation for the lower collection efficiency of the electrostatic precipitator is the fact that the waste gas in the scrubber undergoes a Boudouard reaction in the temperature range of 650 to 350 C, with the finely-distributed iron oxides exerting a catalytic effect. The carbon found in dust samples, forming at high CO concentrations in particular, explains the low collection efficiency.

33063 **APTIC NO. 55696**

Gilewicz, Janusz and Wanda Gut

SOME STUDIES ON A CATALYST FOR PURIFICATION OF WASTE GASES. I. TEMPERATURE PROBLEMS. *(Z badan nad katalizatorem do ocyzyszczania gazow odlotowych. Zagadnienia temperaturowe w reakcji utleniania co tlenem). Text in Polish. Poznan. Towarz. Przyjaciol Nauk Wydzial Mat.-Przyrod. Prace Komisji Mat.-Pryzrod., 13(2):63-68, 1973. 2 refs.*

The research on the application of the nickel oxide catalyst in the process of the carbon monoxide catalytic combustion is described. Optimum conditions of the catalyst activation were determined in the temeprature range of 25-600 C. The catalystic activity was determined in the temperature range of 25-600 C. The thermal stability of the catalyst was found up to 800-900 C. No decrease was observed of the catalytic activity during continuous work up to 100 hr. The surface area of catalyst samples was measured before and after the reaction. The investigated catalyst may be applied in the process of waste gas purification. (Author summary modified)

33064 **APTIC NO. 55672**

Glass, R. W. and R. A. Ross

SURFACE STUDIES ON THE ADSORPTION OF SULFUR-CONTAINING GASES AT 423 K ON POROUS ADSORBENTS. I. THE ADSORPTION OF HYDROGEN SULFIDE, METHANETHIOL, ETHANETHIOL, AND DIMETHYL SULFIDE ON SILICA GELS. *J. Phys. Chem., 77(21):2571-2576, Oct. 11, 1973. 26 refs.*

Calorimetric heats of adsorption were determined at coverages up to 1/10 of a monolayer for hydrogen sulfide, methanethiol, ethanethiol, and dimethyl sulfide, adsorbed at 423 K on silica gels of varying surface hydroxyl group concentrations. Adsorption isotherms were determined and entropies of adsorption calculated to provide additional data on the nature of the adsorbed species. The high values of the initial heats of adsorption of up to 30 kcal/mol are associated with surface heterogeneity. Subsequently, at coverages greater than 0.020 micromole/sq m a similar type of adsorbed species is probably formed by all gases through interactions involving the formation of hydrogen bonds between surface OH H atoms and the S atoms of the adsorbate. The differences in heats, entropies, and adsorption capacities for these gases are believed to be related to the magnitude of the inductive effect on the S atom. A decrease in the heat of adsorption and adsorption capacity and an increase in the entropy of the adsorbed species occurred with all gases as the surface OH group concentration of the silica gels are decreased. The adsorption can possibly be used to remove sulfur compounds from stack gases. (Author abstract modified)

33065 **APTIC NO. 55673**

Glass, R. W. and R. A. Ross

SURFACE STUDIES OF THE ADSORPTION OF SULFUR-CONTAINING GASES AT 432 K ON POROUS ADSORBENTS. II. THE ADSORPTION OF HYDROGEN SULFIDE, METHANETHIOL, ETHANETHIOL, AND DIMETHYL SULFIDE ON GAMMA-ALUMINA. *J. Phys. Chem., 77(21):2576-2578, Oct. 11, 1973. 14 refs.*

Calorimetric heats of adsorption were determined for hydrogen sulfide, methanethiol, ethanethiol, and dimethyl sulfide at 423 K on gamma-alumina at coverages up to theta equals 0.5. Adsorption isotherms were measured and the entropies of the adsorbed species were calculated. Heats of adsorption and adsorption capacities at a given coverage increased with increasing methylation of the adsorbate. A similar type of adsorbed species involving hydrogen bond type interactions between the sulfur atoms of the adsorbate and OH H atoms on the alumina surface is proposed to account for all the results. Differences in heats, entropies, and adsorption capacities among the systems are explained by the increasing inductive effect on the S atoms with increasing methylation of the adsorbate which results in the formation of stronger H bonds with the adsorbent. (Author abstract)

33066 **APTIC NO. 55336**

Hagiwara, Kiyohara

AIR POLLUTION PREVENTIVE EQUIPMENT. *(Taiki osen boshi sochi). Text in Japanese. Nippon Kikai Gakkaishi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(657):165-166, 1973.*

Removal technologies for nitrogen and sulfur oxides are discussed, including two-stage combustion, smoke desulfurization, scrubbers, heavy oil desulfurization, oil gasification, and changing present fuels to low-sulfur liquefied natural gas or naphtha.

33067 **APTIC NO. 55706**

Heer, H.

CLEANING OF WASTE GASES FROM INCINERATORS. *(Reinigung der Abgase aus Muellverbrennungsanlagen). Text in German. Energie (Munich), 25(10):297-298, Oct. 1973.*

Present legal regulations in the Federal Republic of Germany demand that waste gases from incinerators be cleaned to a residual dust concentration of 150 mg/cu m referred to wet flue gases and a carbon/dioxide concentration of 7%. The desired dust reduction is achieved with electrostatic precipitators. These cleaning devices have come into use a decade ago, and although the experience has been extensive, problems cropped up with the first use in incinerators due to the special composition of waste material. Particularly annoying was the emission of partly or entirely carbonized paper particles. They were not retained in the electrostatic precipitator because of low electric resistance. In many cases a multi-cell cyclone was installed after the precipitator. The operating and investment costs increased through this and incrustations in the cyclone through the fine particles were frequent. Nevertheless a number of combined collection systems are still in operation today. Through lower gas velocities in the electric field and through adequate design of the collection electrodes, the problem has been largely solved so that electrostatic precipitators alone suffice in most cases. The development of methods for reducing gaseous pollutants from incinerators is still in the initial stages.

33068 **APTIC NO. 55760**

Hemsath, K. H. and A. C. Thekdi

RICH FUME INCINERATION. *Pollut. Eng., 5(7):38-40, July 1973.*

The incineration of rich fume, a nonexplosive mixture of gases with varying amounts of combustibles, inert gases, and a relatively insignificant concentration of oxygen, necessitates addition of air to provide enough oxygen, mixing of the air and fumes, raising the mixture temperature to accelerate the reactions, and providing the necessary residence time to complete the reactions. Rich fumes containing a high percentage of combustibles may require additional air or another type of heat sink to reduce the incinerator temperature. The amount of excess air depends on the selected incineration temperature and the quality of the fumes. Extensive research on incineration of industrial fumes indicates that the air-fume mixture should be raised to about 1500 F or more; the required residence time will be less than 0.25 sec at these temperatures. The presence of small smoke particles and excessive amounts of inert gases will require slightly higher temperature and additional residence time. A pilot scale rich fume incinerator is illustrated and described.

33069 **APTIC NO. 55621**

Hishida, Kazuo

CONTROL OF HYDROCARBON EMISSIONS. *(Tankasuiso to shori taisaku). Text in Japanese. Kankyo Sozo (Environ. Creation), 3(9):1-13, Sept. 1973. 5 refs.*

Hydrocarbons are emitted by oil refineries, petroleum storage and transport units, gas stations, printing and painting factories, boilers, incinerators, automobiles, and airplanes. The automobile contributes 57.3% of the HC in the Tokyo Bay area. Often two or more control techniques are required for one source. Emissions from organic solvents can be controlled by a combination of combustion, catalytic oxidation, adsorption, or condensation. Control of 10,000 ppm or more HC can be done by combining condensation and adsorption, concentrations of less than 1000 ppm can be controlled by combustion or catalytic oxidation. Adsorption or catalytic oxidation should be used for concentrations below 10 ppm.

33070 **APTIC NO. 55427**

Ichijo, Michio

THE TREND OF POLLUTION CONTROL TECHNIQUES IN NON-FERROUS METAL INDUSTRIES. *(Hitetsu kinzokugyokai ni okeru kogai boshi gijutsu no doko). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 2(9):63-67, Sept. 1973.*

Most of sulfur dioxide in the roasting gas of mine ore is captured as sulfuric acid. The weak SO2 which had been discharged in the air by high stacks for many years is now arrested and utilized for the production of sulfuric acid, or scrubbed by alkali. The gas leakage in copper refineries, which has been treated by a simple hood and suction of gas, is now changing into systems of gas treatment for the total building. Alkaline neutralization, production of gypsum, zinc oxide, and magnesium oxide are some of the methods used by refineries using all types of furnaces. The danger of over supplies of such by-products as sulfuric acid or sodium sulfite is always present, although the problem which has existed in the past has been eliminated for the time being by new demands in the fertilizer field and demands for construction material. New countermeasures in the case of oversupply must be developed. The urgent project for the present is an effective use of captured mine dusts by returning them in some way to the mine refining process. High concentration zinc dust from open electric furnace can be treated by the Weltz Kiln and zinc and lead can be recovered. In closed systems, which are gradually developing, exhaust gases from pyrite cinder chloride roasting in rotary kilns are scrubbed and the entire metal residue in the scrub water is completely recovered. Gypsum, copper, iron, lead, and zinc are recovered and calcium chloride is recycled. Kurabo has completed a total pollution control system which connects the processes of desulfurization of stack gas, liquid waste treatment, and sludge incineration.

33071 **APTIC NO. 55702**

Kano, Takeshi, Hideo Takahashi, Sadao Shibuya, and Kunio Nishiyama

PLANNING AND ITS APPLICATION FOR INSIDE-SHOP DUST COLLECTING SYSTEM. *(Kenoku shajin sochi no keikaku to jissai). Text in Japanese. Funtai Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan), 10(7):392-399, Sept. 1973.*

Dust and smoke deflagrated from electric arc furnaces, converters, and induction furnaces are emitted to the atmosphere without processing. An inside dust collecting system can be installed to prevent the heated dirty air from these sources from escaping to the atmosphere. With this system, the shop is completely enclosed and the emissions are collected for disposal within it, so that the working environmental in the shop is not deteriorated. The design criteria of the collecting system are discussed, with attention being paid to the calculation of the volume of heated air to be collected, the design of the hood, and collection plans for electric arc furnaces and converters.

33072 **APTIC NO. 55622**

Kato, Seitaro

CONTROL TECHNIQUES OF PAINT PIGMENTS AND ORGANIC SOLVENT VAPORS. *(Toso funjin oyobi yuki yozai joki no shori gijutsu). Text in Japanese. Kankyo Sozo (Environ. Creation), 3(9):14-28, Sept. 1973.*

Vapors from paint pigments and solvents can be collected by trapping them at the wet wall formed with water and a metallic plate in a water booth. This gives 85% efficiency for paint pigments, but very small efficiency for solvents. Adsorption, combustion, or catalytic oxidation can be used to remove solvents. Adsorption is most effective on low concentrations. The combustion technique gives 90% or higher removal efficiency when burned efficiently; but when noncombustible gases such as steam and nitrogen are contained, efficiency is low. Catalytic oxidation is the most effective removal method for hydrocarbons.

33073 **APTIC NO. 55353**

Kemmetmueller, Roland

DRY COKE QUENCHING--PROVED, PROFITABLE, POLLUTION-FREE. *Iron Steel Engr., 50(10):71-78, Oct. 1973. 12 refs.*

The pollution control advantages of dry coke quenching is discussed. There is no water or air pollution. Dry quenching is carried out in a completely closed cycle operation. There are no emissions of any kind to the atmosphere, or to rivers, because no quenching water is required. Dry coke quenching is a revenue producing investment. Anti-air pollution installations are nonrevenue producing. A view of the mounting legal and public pressure for stricter environmental control, dry coke quenching, which combines legal necessities with economic advantages, becomes especially attractive. There is a somewhat dustier atmosphere in the screening station due to the dryness of the dry quenched coke compared to wet quenching. A properly designed exhaust system can solve the dust problem that might develop in the screening station. Additional advantages, a flowchart, and a description of the process are presented.

33074 **APTIC NO. 55613**

Kimura, Norio and Yoshiya Hasegawa

PRESSURE DROP OF A SUBMINIATURE CYCLONE. *(Chokogata saikuron no atsuryoku sonshitsu). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 335-336, 1973. 11 refs. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

Fine particles can be separated and collected with high efficiency in a cyclone dust collector. Two hundred kinds of subminiature cyclones with 10 mm and 20 mm diameters were studied. They had different inlet shapes, outlet diameters, cylinder lengths, conical angles, and dust-collecting hole diameters. The effect of pressure drop and the effect of the cyclone factors on pressure drop were studied.

33075 **APTIC NO. 55620**

Kimura, Norio, Kazuro Murakami, and Akira Terawaki

COLLECTION EFFICIENCY OF A WET TYPE IMPACT DUST COLLECTOR -- IN THE CASE OF A TWO-DIMENSIONAL NOZZLE. *(Shisshiki shototsu shujinki no hoshu koritsu -- nijigen nozuru no baai). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 329-330, 1973. 3 refs. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

The dust collection mechanism of a wet-type impact dust collector was studied using a two dimensional nozzle. The theoretical collection efficiency was obtained in order to compare with the experimental values obtained by varying the factors (liquid depth, surface tension, and viscosity) of a liquid. The aerosol was produced by the evaporation and condensation method; it had a grain size of 1-1.8 micron. The collection efficiency was obtained by measuring aerosols at the dust collector outlet in terms of scattered light. Efficiency increased as the liquid depth increased; but there was little difference on the great flow velocity side. The effect of surface tension of the impact liquid on the collection efficiency and the effect of the viscosity of the impact liquid on efficiency were the same in theoretical and experimental results.

33076 **APTIC NO. 55339**

Kitagawa, Hiroshi

ON ACTIVATED CARBON. I. PRODUCTION AND PHYSICAL AND CHEMICAL CHARACTERISTICS. *(Kasseitan ni tsuite (sono 1) Seizo to Bussei). Text in Japanese. Kogai (Hakua Shobo (Pollution Control), 8(3):123-137, May 1973. 109 refs.*

A process for producing activated carbon and its physical and chemical nature are surveyed. The capacity of the carbon to adsorb various substances is discussed. Surface properties affect the adsorption efficiency.

33077 **APTIC NO. 55376**

Kitagawa, Hiroshi

ACTIVATED CARBON (NO. 2): ADSORPTION AND ADSORPTION DEVICE. *(Kasseitan ni tsuite (sono 2): Kyuchaku oyobi kyuchaku sochi). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 8(4):2-14, July 1973. 43 refs.*

The adsorption capacity of activated carbon, adsorption equilibrium, and adsorption speed are discussed as preliminary factor findings for designing and adsorption system. Gas adsorption is measured by volume, weight, or fluidity. Liquid adsorption is measured by mixing powdered activated carbon in liquid, and after stirring the mixture, filtering the liquid through a millipore filter of 0.22-0.45 micron and analyzing the filtered liquid. The liquid concentration difference before and after adsorption is the maximum attainable adsorption. The adsorption speed is measured by the time change of the adsorption quantity as it approaches the saturation point. The speed is determined by the slowest speed of the following three stages: the material movement speed in the fluid interface membrane around the activated carbon; the speed of diffusion of adsorbed material in the carbon particles; the adsorption reaction speed on the internal surface of carbon. Methods for calculating these speeds are presented by formulas. Contact filter adsorption systems can be single or multiple adsorption systems. A multiple adsorption system can utilize a parallel flow system, or a counterflow system, or a continuous stirring system. The fixed layer, mobile layer, and fluidized layer systems are discussed.

33078 **APTIC NO. 55591**

Komada, Eiji

METHOD TO MAKE USE OF ULTRA-FINE PARTICULATES OF METAL OXIDES COLLECTED FROM AN ELECTRIC FURNACE. *(Denkiro ni okeru hoshu chobirvu kinzokusankabutsu no riyoho). Text in Japanese. (Showa Denko K. K., Tokyo (Japan)) Japan. Pat. Sho 48-29283. 3p., Sept. 8, 1973. (Appl. May 22, 1969, 1 claim).*

A new way to make use of ultra-fine metal oxide particles contained in electric furnace dust is described. The dust is removed from flue gas to prevent air pollution and is added to heavy oil fuel for reduction of sulfur oxides. This avoids corrosion of the stack and other parts of the combustion equipment by sulfuric acid which forms from the SOx. When the heavy oil is burned, the sulfur dioxide and H2SO4 produced react with the metal oxides to form noncorrosive compounds. Vanadium oxides react with the metal oxides to form composite oxides which easily peel off from the metal parts of the equipment, thus minimizing vanadium corrosion.

33079 **APTIC NO. 55742**

Krzywanski, Wieslaw, Tadeusz Czechowicz, and Zenon Polus

THE USE OF FIBERS IN DRY FILTRATION PROCESSES. *(Zastosowanie wloknin w procesach filtracji suchej). Text in Polish. Gaz, Woda Tech. Sanit. (Warsaw), 47(8):268-272, 1973. 6 refs.*

Utilization of fibers as a dry filtration means in major industries, the fiber s structure and properties, and the mechanism of dry filtration processes are described. Fibers are used in the cement, lime, gypsum, ceramics, clinker, and chemical industries to prevent excessive dust pollution. Fibers are often used in various ventilation and air conditioning installations for both rudimentary and complete air purification. Needle fibers are less expensive and more efficient than textiles, and have a uniform structure. The following technological parameters decide the efficiency of the given fibers: surface mass of texture, number of needles/1 sq cm, depth of needles, type of texture, thickness and length of fiber. The structure and utilization possibilities of the fibers can be changed according to necessities. The United States and West Germany have the most up-to-date achievements in this field. Studies conducted at the Lodz Textile Institute, the Central Technical Textiles Central Laboratories, and the Scientific Research Institute of the Textile Industry in Sofia proved that utilization of fibers for dry filtration processes is efficient and inexpensive.

33080 **APTIC NO. 55581**

Lange, Karlheinz and Georg Gaede

CLEANING OF OTTO ENGINE EXHAUSTS BY OXIDATION CATALYSTS. *(Reinigung von Ottomotor-Abgasen durch Oxydations-Katalysatoren). Text in German. Staub, Reinhaltung Luft, 33(10):391-394, Oct. 1973. 6 refs.*

Precious metal catalysts on a monolythic carrier were examined on an engine dynamometer. The engine was operated with a rich mixture. The temperature of the exhaust gas was adjustable by a cooler. The exhaust gas temperature and concentration could be measured behind the engine, as well as before and after the catalyst. A nondispersive infrared analyzer was used for carbon monoxide and dioxide and nitric oxide. Oxygen was measured with a magnetic analyzer and the hydrocarbons with a flame ionization detector. For maintaining an oxidizing atmosphere at all times, secondary air was blown into the exhaust gas ahead of the catalyst. Gasoline with a density of 0.74 g/ml at 15 C, a lead content of 0.006 g/l, a sulfur content of 0.003% and a research octane number of 91 was used as a fuel. The CO conversion was complete when the O2/CO ratio was higher than 0.5. From this ratio onward the conversion of hydrocarbons was also relatively high, 75 to 95%. The catalysts reacted rapidly within a temperature range of 200 to 350 C. The conversion rate did not go down until a sufficiently high flow speed was reached. These results did not differ much among the various types of catalysts.

33081 **APTIC NO. 55758**

Lauren, Oscar Bud

ODOR MODIFICATION. *Pollut Eng., 5(7):27-29, July 1973.*

Odor control, particularly odor modification, of industrial emissions is reviewed. Modification (compensation) of odors involves lowering the malodor intensity and mixing it with selected chemical gases or vapors. Two substances of given concentrations often result in a far less intense odor than that of the separate components when mixed in a given ratio. The modification phenomenon is essentially a decrease of olfactory intensity, and modification occurs in the majority of cases where two substances are mixed in uneven proportions. Odor modification should not be used as a substitute for good housekeeping, and where feasible and economical malodor should be eliminated or destroyed at the source. No attempt should be made to modify any gas or vapor that may be possibly toxic or harmful, and odor-modifying chemicals must conform to existing specifications and regulations of regulatory agencies.

33082 **APTIC NO. 55617**

Machi, Sueo

THE TREATMENT OF EXHAUST SMOKE WITH AN ELECTRON BEAM. *(Denshisen ni yoru haien shori). Text in Japanese. Gijutsu to Kogai (Tech. Pollut.), 3(4):499-502, Sept. 1973. 3 refs.*

A method to eliminate sulfur dioxide and nitrogen oxides is described. Exhaust gas containing 1000 ppm of SO2 and 200 ppm of NOx was irradiated by an electron beam from the linear accelerator with an energy of 5.5 Mev and a current of 70 microamps. Sulfur dioxide disappeared almost completely within 9 min. With the continuous irradiation flow method, the exhaust gas is led through an electrostatic dust collector to the radiation chamber. Irradiated gas is exhausted by the blower after the aerosols are eliminated in a second electrostatic precipitator. One hundred percent of the SO2 and 80% of the NOx were eliminated by this treatment within 4 sec. A higher power electron beam source is necessary for the practical use of this method from the aspect of economics.

33083 **APTIC NO. 55598**

Masuda, Nobuo

PREVENTION OF NITROGEN OXIDES EMISSION FROM A FIXED COMBUSTION SYSTEM. *(Teichishiki nensho sochi yorino chissosankabutsu hassei boshi). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(9):833-848, Sept. 1973. 20 refs.*

A new burner is described for reducing nitrogen oxide emissions from fixed combustion systems by decreasing oxygen partial pressure, combustion temperature, and residence time in high temperature. Presently available combustion equipment have a difficult time satisfying these requirements because they have been designed to perform for a long time at the highest temperature possible. Flue gas recirculation, two-stage combustion, and combustion in a small excess of oxygen have been developed. The new burner uses recirculation, but differs from general recirculation systems in which low temperature flue gas is recirculated to lower the combustion temperature; instead the present system uses internal recirculation in which the hot gas is recirculated to promote complete gasification of fuel and to shorten the combustion time. The burner was tested with 10 kg fuel/hr; nitric oxide decreased with increasing oxygen concentration, and the NO emission could be kept at less than 90 ppm, which is less than half the Tokyo emission standard. Burners are available in capacities of 60,000-4,000,000 Kcal/hr.

33084 **APTIC NO. 55668**

Matsumoto, Iwao and Tadato Yamamoto

OXY-FUEL (I) PROPERTIES OF GASOLINE CONTAINING ALCOHOLS. *(Oshiki nenryl (I) Arukoru rui ganyu gasorin no nenryo seijo). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 52(556):680-690, Aug. 1973. 4 refs.*

The efficacy of using gasolines containing oxygenated compounds, particularly alcohols, in gasoline engines was determined by studying the emission components of the exhaust gas. Oxygenated compounds increased the octane number of the gasoline. In addition, the alcohol-containing gasolines have a lower calorific value and higher thermal efficiency ghan gasolines lacking the oxygenated compounds. The use of alcohol-containing gasolines results in a larger specific fuel consumption at the same ratio of excess air, although there is no drop in the maximum output of the engine with such fuels. The maximum engine output is increased by increasing the amount of alcohol in the gasoline while maintaining a higher ratio of excess air. The maximum concentration of oxides of nitrogen in the exhaust gas was decreased with increasing amounts of alcohol in the fuel. The use of gasolines containing alcol may effectively reduce the emission of NOx in the exhaust gas without lowering the engine output.

33085 **APTIC NO. 55349**

McIlroy, Robert A., Glenn A. Atwood, and Coleman J. Major

ABSORPTION OF SULFUR DIOXIDE BY MOLTEN CARBONATES. *Environ. Sci. Technol., 7(11):1022-1028, Nov. 1973. 22 refs.*

Absorption of sulfur dioxide by molten carbonates, one of the many processes proposed to reduce atmospheric pollution by fossil fueled power plants is discussed. The absorption of SO2 by a ternary eutectic mixture of sodium, potassium, and lithium carbonates was studied using three small absorbers. A synthetic flue gas was bubbled through a pool of molten salt, and the concentration of SO2 in the effluent was measured. The fractional absorption could be correlated by the equation In(pi vinculum/piO) equals A-(pie sq DIM/R2)t where piO is the inlet concentration pi vinculum is the exit concentration, t is the superficial contact time, DiM is the diffusivity of SO2 in the flue gas, and R is an effective drop radium which is dependent on the reactor geometry. The equation was developed for transfer from a stagnant bubble of constant volume. This model applies as long as the carbonate fraction is greater than 0.3. The coefficient (pie sq Dim/R2) ranged from 0.2 to 0.8 and over 97% of the SO2 was absorbed as long as the contact time was greater than 0.015 sec. Thermodynamics, reaction mechanisms and mass transfer are discussed. (Author abstract modified)

33086 **APTIC NO. 55762**

Minnick, L. John

ECONOMIC CONVERSION OF INDUSTRIAL BYPRODUCTS. *Preprint, 9p., 1973. 10 refs. (Presented at the International Pollution Engineering Congress, Philadelphia, Pa., Oct. 22-25, 1973.)*

The economic conversion of wet sludges from power plants to stablized compositions that are ecologically safe is reviewed. There are methods designed to work on sulfur oxide gas. The fly ash is usually recovered as a separate waste from the power plant. Some fly ash is utilized in the construction industry and in the manufacture of light weight aggregates. The major portion of fly ash production must be sent to land disposal areas and discarded. A demonstration project was conducted to determine the feasibility of incorporating waste sludge within a stabilized fly ash fill composition. The composition was used in the construction of an extension of a major national artery. Tests indicate an above average performance. An additional advantage is that the material can be stockpiled without deleteriously influencing the chemical reactions.

33087 **APTIC NO. 55653**

Mitomo, Kenichi

DEODORANT FOR ODOROUS ORGANIC SUBSTANCES. *(Yushu yuki busshitsu no dasshuzai). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 48-14049. 6p., May 2, 1973. (Appl. Aug. 5, 1970, 2 claims).*

Two deodorants are discussed, one containing the 1.2-dehydro-6-ethoxy-2.2.4-trimethylquinoline (referred to as ethoxyquin) and one containing this compound plus an alkali metal or alkali earth metal compound. Among the latter are magnesium sulfate, calcium phosphate, sodium dihydrogen phosphate, magnesium carbonate, calcium hydroxide, magnesium oxide, and calcium oxide. The deodorant ethoxyquin was added to chicken excrement. Half of the mixture was dried in the sun and smelled by eight persons who smelled no offensive odors. The other half was dried in a rotary drum and smelled by a panel of eight persons who also smelled no offensive odors.

33088 **APTIC NO. 55587**

Mizuno, Minoru

ENVIRONMENTAL MEASURES IN THE IRON AND STEEL INDUSTRY, AND ITS PROCESSES ORIENTING TOWARD CLOSED SYSTEM. *(Tekkogyo ni okeru kankyotaisaku to sono kurozudo shisutemuka eno shiko). Text in Japanese. Kankyo Sozo (Environ. Creation), 3(8):41-48, Aug. 1973.*

Pollution emission sources, control systems, and closed system processes are discussed for the iron and steel industry. Sulfur oxides are emitted by sintering, coke ovens, heating furnaces, and boilers. Low-sulfur ore use, high stacks, and desulfurization of stack gas can reduce SOx emissions to 100 ppm or less. Hydrogen sulfide in coke oven gas is reduced to sulfur dioxide during combustion. This problem can be solved by desulfurization. Almost 70% of the fuel is supplied by the blast furnace gas, converter gas, and coke oven gas produced in the iron works itself. Low-sulfur fuel use can also minimize SOx production. Dust can be removed by scrubbing and collectors. The scrubbing water can be recirculated. A closed process is described consisting of combining SO2-containing stack gases from the sintering plant with ammonia produced from coal to produce ammonium sulfate. Scrap from blister steel production can be collected and returned to the manufacturing process.

33089 **APTIC NO. 55335**

Morita, Shozo

COUNTERMEASURES AGAINST POLLUTION IN THE IRON AND STEEL INDUSTRY. *(Tekko no kogai taisaku). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 2(10):50-57, Oct. 1973.*

Control methods in Japan s iron and steel industry are discussed. A 150,000 N cu m/hr pilot desulfurization plant is being studied for sintering smoke desulfurization. By-product recovery, dinitrification of fuel, and development of atomic power are possible control methods.

33090 **APTIC NO. 55343**

Ohnishi, Shigeru

DEVELOPMENT OF A LOW EMISSION TWO-STROKE CYCLE GASOLINE ENGINE (NICE). *(Teiyugai haiki tsu saikuru kikan no kaihatsu). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 12(139):11-15, June 1973.*

A low emission two-stroke engine was developed which has improved intake, scavenging, improved combustion room shape, and an afterburner. By improvement of combustion and control of scavenging flow, the amount of vibration and knocking at idling were lowered and harmful exhaust pollutants were reduced. The system meets the Muskie law of 1976. A fuel stopping device stops the supply of fuel and the exhaust of pollutants during slow down.

33091 **APTIC NO. 55337**

Oka, Takeshi

OUTLOOK AND EXPLANATION OF COMBUSTION METHODS FOR ENGINE EMISSION CONTROL. *(Shoenenshobo ni yoru kogai teigen saku no shohoteki tenbo). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 12(139):73-78, June 1973. 2 refs.*

The combustion temperature and pressure, the end of expansion temperature and pressure, and the average effective pressure of a hypothetical cycle were calculated. Various combustion methods were compared under similar conditions; results were similar to experimental results. The combustion temperature of ethyl alcohol (used for alcohol) was considerably lower compared to the combustion of gasoline alone (normal octane); it was lower and the output dropped particularly in the case of water-containing alcohol. In the case of gasoline containing 20% water or ethyl alcohol, the combustion temperature was not remarkably lower than that of gasoline alone. When gasoline was sprayed with 20% water, the lowering of combustion temperature was about equal to the case of the spray alcohol. When about 20% alcohol and water is added to the gasoline, the lowering of the output is small; but when added in an effective quantity, the output is naturally lowered.

33092 **APTIC NO. 55679**

Oshida, Yasunari

THE FLUE GAS DESULFURIZATION PLANT MAKING USE OF ADSORPTION BY ACTIVE MANGANESE OXIDE. *(Kassei sanka manganho haien datsuryu sochi ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(9):889-894, Sept. 1973.*

A dry adsorption flue gas desulfurization plant of a capacity of 326,500 N cu m/hr is described. The process consists of adsorption of sulfur oxides, regeneration of adsorbent, and crystalliztion of ammonium sulfate. Active manganese oxide reacts with sulfur dioxide in the exhaust emission to form manganese sulfate. The MnSO4 is treated with ammonia to regenerate the manganese oxide and the side product, ammonium sulfate. This plant has been constructed to a power plant of 220 MW on the basis of data obtained for a pilot plant of a capacity of 150,000 N cu m/hr and designed to perform at a desulfurization efficiency of 85 + or 5%, with the inlet exhaust temperature of 135 C and the outlet temperature of above 105 C, to produce 17.5 t/day of (NH4)2SO4. The actual operation showed the desulfurization efficiency of higher than 85% to reduce the inlet SO2 concentration of 350-420 ppm to the outlet SO2 concentration of 30-60 ppm. The temperature fall inside the plant was 20 C, and the outlet temperature was kept at 115 C. The pressure drop was 17 mm Aq in the adsorption, 170 in the multicyclone, and 10 in the electrostatic precipitator at the exhaust emission of 337,000 N cu m/hr, which was well below the planned total pressure drop of 250 mm Aq. Further research should be made on the retention of high desulfurization efficiency at the frequent starting and stopping of the plant, on the adhesion of the adsorbent to the adsorbent feeder, and on the retention of adsorbent capacity for a long time operation.

33093 **APTIC NO. 55769**

Pasynkiewicz, Jadwiga

WASTE GAS DESULFURIZATION AND ENVIRONMENTAL PROTECTION. *(Problem odsiarczania gazow a ochrona srodowiska). Text in Polish. Gaz, Woda Tech. Sanit. (Warsaw), 47(8):277-279, 1973. 23 refs.*

The maximum allowable concentrations of sulfur compounds in the air in different countries, the present technical achievements in gas desulfurization, desulfurization methods, and research trends in fuel gas desulfurization are discussed. The maximum pollutant concentrations allowed by United States standards are 0.3 mg/sq m for sulfur dioxide and 0.01 mg/sq m for hydrogen sulfide; in the Soviet Union--0.5 mg/sq m and 0.008 mg/sq m; and in West Germany--0.75 mg/sq m and 0.15 mg/sq m, respectively. These standards apply for 1 hr, 1/2 hr, and 20 min, respectively, for the three countries. In Poland, the figures are: 0.35 mg/sq m/20 min for SO2, and 0.06 mg/sq m/20 min for H2S. Desulfurization by monoethyleneamine (MEA), carbon under pressure, Rectisol, Thylox, and Perox, are discussed. The Perox method has a 99.99% desulfurization efficiency for a 9.1 g/sq m H2S content in the gas. There is a 1.4 kg/ton recuperation of S, using hydrochinone as a catalyst, 8000 kg/ton air and 4000 kg/ton water steam utilization. Poland applies the MEA method for earth gases, the Thylox method for coking gases, and dry methods for municipal gases. The cost of gas purification when applying the different methods is $1,690,000/cu mn with the Giammarco Ventrocoke method; $2,890,000 with the hot potassium method; and 3,550,000 with the MEA method. Different methods should be applied for desulfurization of different substances in order to obtain maximum efficiency.

33094 **APTIC NO. 55453**

Pershing, D. W., G. B. Martin, E. E. Berkau, and R. E. Hall

EFFECTIVENESS OF SELECTED FUEL ADDITIVES IN CONTROLLING POLLUTION EMISSIONS FROM RESIDUAL-OIL-FIRED BOILERS. (FINAL). *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab., 49p., Aug. 1973. 8 refs.*

The effectiveness of four fossil fuel additive materials, Trimex, PACE, KAP, and Glo-Klen, in controlling pollutant emissions from fossil fuel combustion was evaluated. Each material was carefully examined in a highly instrumented package boiler over the range of typical operating conditions (e.g., combustion intensity and residence time) for industrial and utility systems. The test results showed that Trimex, PACE, KAP, and Glo-Klen do not reduce emissions of sulfur oxides, nitrogen oxides, carbon monoxide, or unsaturated hydrocarbons under any condition tested. None of the additives can be recommended as a means of controlling pollutant emissions based on the test results, boiler operating problems, and the possibility that use of the additives might create potentially harmful new emissions. (Author abstract modified)

33095 **APTIC NO. 55637**

Reynolds, Jefferson W. and Cephas H. Sloan

TOBACCO SMOKE FILTER. *(Eastman Kodak Co., Rochester, N. Y.) U. S. Pat. 3,724,469. 6p., April 3, 1973. 4 refs. (Appl. Sept. 23, 1971, 5 claims).*

A cigarette filter containing certain cobalt or iron chelates adsorbed or supported on the surface of a suitable particulate support such as activated carbon particles has been designed to remove substantial quantities of nitrogen oxides from cigarette smoke. Chelates suitable for use in the device are composed of iron or cobalt and an organic compound containing a C-double-bond-N group and a functional group capable of forming a bond with the iron or cobalt atom. The chelate of cobalt and the condensation product of salicylaldehyde and ethylene diamine is a particularly desirable choice. Polyethylene glycol diacetate is a particularly desirable plasticizer for the cellulose acetate fibers because it can also be used for bonding the activated carbon particles to the cellulose acetate fibers. The filter could also be used to remove NOx from other gases. (Author abstract modified)

33096 **APTIC NO. 55394**

Ritter, William W.

GEOTHERMAL ENERGY: PROSPECTS AND PROBLEMS. *J. Environ. Health, 35(5):432-435, March/April 1973. 4 refs.*

By 1975, the United States will obtain an estimated 1500 megawatts from geothermal energy, and by 1985, the figure will be 7000 megawatts. Mexico, Japan, and the Soviet Union are among the other countries which are beginning to exploit this energy source. Geothermal reservoirs result from a natural heat-transfer circuit in the earth s crust; their temperatures range from 400 to 700 F, providing sufficient thermal energy to produce electric power. The lower heat flow regions which vary in temperature between 150 and 250 F cannot be used for electric power production, but can be used for such things as residential heating and domestic hot water. The greatest expenses associated with geothermal power production are related to exploration, drilling, steam transmission, and plant maintenance, in that order. Both capital and operating costs are lower than for other types of thermal plants, and the construction cost of a geothermal plant is 2/3 to 3/4 that of a fossil fuel plant and less than 1/2 that of a nuclear plant. A geothermal plant is relatively simple to operate and requires maintenance personnel only during the day. Geothermal power production involves relatively little environmental pollution; the natural steam is low in sulfur, although the ammonia and boron which are present require pollution control. Problems associated with geothermal energy utilization in the United

States include: the fact that 75% of the known resources are located on government-owned recreational land; the necessary delay between the discovery of a reservoir and beginning of plant production; the corrosion, scaling, and effluent disposal problems created by dissolved minerals in the steam; and the difficulties involved in transmitting the electric power to the principal load centers.

33097 **APTIC NO. 55389**

Romaine, Ed

RAM RIVER PLANT CANADA S LARGEST SULFUR PRODUCER. *Can. Petrol., 14(3):27-30, March 1973.*

A gas processing plant at Ram River, Alberta, Canada operated by the Aquitaine Co. of Canada Ltd. includes four 1000 long ton/day two-stage Claus sulfur recovery plants which are achieving 96% sulfur recovery with a new Kaiser S-201 catalyst. Tail gas from the first two plants completed is treated in a Sulfreen unit with a carbon catalyst, while tail gas from the other two units will be treated in a Sulfreen unit to be completed in mid-1973 which will use an alumina catalyst. Overall recovery of the two Claus units plus the Sulfreen unit is greater than 98%. The sulfur units generate 1.6 million lbs/hr of steam at 360 psig which is supplemented by steam from two 175,000 lbs/hr gas-fired power boilers. The operators have complete control of the wells and the plant through the supervisory control system located in the control room. A map, plant layout, and flow diagram are included.

33098 **APTIC NO. 55759**

Roots, D. C.

ELIMINATION OF ATMOSPHERIC POLLUTANTS FROM COATING OR PAINTING OVENS. *Metal Finishing J. (London), 19(222):200-201, 199, July 1973.*

Three systems for incinerating solvent-laden (hydrocarbon) air from painting and coating operations are described. The first system is designed to achieve the desired degree of oxidation of the contaminants by careful control of furnace temperature, residence time, and turbulent mixing. The fume exits to a stack connection via a heat exchanger designed to preheat the fresh air to the oven by cooling of the incinerator exhaust gases. The design of the heat exchanger ensures that no mixing of the two streams can occur. The second system combines the advantages of economic operation due to heat recovery and the use of fresh clean air. The advantage of the system is the reduction in cost and space required by eliminating the heat exchanger. The third system is a straight-through incineration system which has the lowest capital cost but nevertheless ensures the same degree of solvent destruction. A quantity of dilution air is mixed with the incinerated gases to reduce the stack entering temperature. All three systems reduce running costs to reasonable levels by the use of heat recovery techniques.

33099 **APTIC NO. 55344**

Saito, Takashi

A VIEW OF COUNTERMEASURES AGAINST CAR EXHAUST. *(Jidosha haiki gasu taisaku no tenbo). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Chem. Ind.), 26(9):590-593, Sept. 1973. 16 refs.*

Automobile control methods include engine operation modifications and engine design modifications (steam, electric, rotary, and gas turbine engines). Thermal reactors, afterburners, and catalytic afterburners may be used to control pollution, but they do not reduce nitrogen oxides. The NOx can be reduced by lowering combustion temperature and oxygen concentrations. Since these methods reduce the efficiency of the car, the costs of running the car increase. The cleaning equipment also has a durability problem.

33100 **APTIC NO. 55784**

Sano, H.

LIME EMULSION BLOWING SYSTEM EXHAUST GAS DESULFURIZATION. *(Nyuka sekkai fukikomi shiki haien datsuryu). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 9(10):1003-1006, Oct. 1973. 6 refs.*

A lime emulsion blowing system for exhaust gas desulfurization consists of a calcium salt solution directly mixed with fuel. The emulsion is blown into the furnace so that as the particles of calcium oxide are formed, desulfurization occurs. The system was studied experimentally with 0.3-3% sulfur fuel oils. The efficiency was 80-90%. Removal limit was 20-25 ppm of sulfur oxides. Maximum desulfurization occurred with an air ratio of 1.3; lower air ratios decreased desulfurization due to insufficient oxygen concentration.

33101 **APTIC NO. 55526**

Schlaug, Hans

SIMULTANEOUS PURIFICATION OF GASES CONTAINING DUST AND GAS IMPURITIES. *(Verfahren zur gleichzeitigen Gasreinigung von Staubfoermigen und gasfoermigen Verunreinigungen). Text in German. (Veba-Chemie AG, Gelsenkirchen-Buer (West Germany)) W. Ger. Pat. 1,546,683. 6p., March 15, 1973. 10 refs. (Appl. Feb. 11, 1965, 5 claims).*

The simultaneous purification of gases containing dust and as impurities is described. The gas stream is divided into partial streams. Each partial stream is accelerated to 25 m/sec in nozzles. The stream leaving these nozzles impinges vertically upon the surface of a wash liquid. For after purification, the purified gas is led through vertical plates sprinkled with wash liquid, at a flux of 5 m sec. Finally it is lead into a drop separator. This method can be used in the production of artificial fertilizer.

33102 **APTIC NO. 55678**

Schmidt, Ernst

EXPERIENCES WITH MEASURES TAKEN TO ABATE AIR POLLUTANT EMISSIONS. *(Erfahrungen mit Massnahmen zur Verminderung der Emission luftverunreinigender Stoffe). Text in German. Ziegelind. (Weisbaden), no. 9:325-334, Sept. 1973. 11 refs.*

Effectiveness and cost of various devices and installations used to abate air pollutant emissions at brick factories are discussed in detail. The differentiation is made between emission and immission, illustrated by showing the diffusion of flue gases using a long time exposure. Sulfur dioxide, fluorine, and aluminum emissions are described. The sulfur content found in emissions varied between 0.1 and 2 g/cu m in the form of SO2. The legal apsects of standards, rules, and regulations concerning the maximum allowable pollutant emissions are discussed. The maximum emission standards in Germany are 0.750 mg/cu m SO2 for short emissions and 0.4 mg/cu m for long ones. they are 0.005 mg/cu m and 0.002 mg/cu m for fluorine respectively. The normal allowed pollutant concentration limit is 0.350 mg/cu m SO2 and 0.003 mg/cu m fluorine. Decomposition of lime leads to generation of calcium oxide and carbon dioxide. Lime disintegration depends on the temperature. The mean values of fluoride and SO2 at kilns fired with coal, heavy oil, light oil, and gas are 48 mg/N cu m fluoride, and 0.49 g/N cu m SO2. Various types of dry absorption and wet scrubber installations are described.

33103 **APTIC NO. 55655**

Schmidt, Reinhold H.

A CONTRIBUTION TO ECOLOGICAL PROTECTION: DUST-FREE HANDLING OF BULK GOODS. *(Ein Beitrag zum Umweltschutz: Schuettgueter mit Schiffentladern staubfrei umschlagen). Text in German. Foerdern Heben, 23(13):702-703, 1973.*

A dust collection system for dust-free cargo-handling on freighters is described. At the grab entrance two countercurrent air circulatory flows are produced creating a dust barrier. The inflowing air carries all dust agitated by loading or discharging activities into the dust collector. This method does not require the high speed with which conventional systems draw on the dust-laden air. The dust collection system therefore can be of smaller dimensions. The dust collector starts at the upper rim of the bunker for the bulk goods and does not protrude over the crane profile. The grab enters on the seaward side, passes the air barrier, and discharges the bulk material in the center of the bunker. The dust collector is equipped with envelope-type cloth filters with countercurrent air jet cleaning coupled with automatic rapping of the envelopes. The entire dust collection system has a power demand of about 90 kW, four ventilators, a throughput of 80,000 cu m/hr, and a filter area of 864 sq m.

33104 **APTIC NO. 55605**

Schuetz, H.

POSSIBILITIES OF AIR FILTRATION IN SPRAY COATING AND OF PAINT SPRAY AND POWDER SEPARATION. *(Moeglichkeiten zur Luftreinigung beim Farbspritzen und zur Farbnebel - sowie Pulververabscheidung). Text in German. TZ. Prakt. Metallbearb., 67(6):225-230, 1973.*

Possibilities of purifying supply and waste air reclaiming possibilities are discussed. Surfaces for finished products are refined by spraying or similar misting techniques. A considerable amount of sprayed particles do not reach the surface, but the surrounding area, preventing long periods of spraying in work areas with low intake air supply. The most frequently used material for vapor and gas adsorption is activated carbon having a large internal surface area and high porosity. The adsorption oxidation technique has been developed for cleaning 1000 sq m waste air/hr with an activated carbon drum-type air filter. When 100 kg of paint was sprayed, 50% was solid material, 70% reaching the surface, 30% wasted. Elimination of the wasted solvent and solid material is discussed. Paint mist separators of metal filter cells with lamellar baffles are also used. Conventional modern, and future spraying booths are compared, and a powder coating system and a weave-type dust separator are described.

33105 **APTIC NO. 55352**

Siegmund, C. W. and D. W. Turner

NOX EMISSIONS FROM INDUSTRIAL BOILERS: POTENTIAL CONTROL METHODS. *Combustion, 45(4):24-30, Oct. 1973. 17 refs. (Presented at the American Society of Mechanical Engineers Industrial Power Conference, Louisville, Ky., May 14-20, 1973, Paper 73-IPWR-20.)*

Potential control methods for nitrogen oxides emissions from industrial boilers are discussed. Control methods are the same as those for utility boilers: low excess air, flue gas recycle, and two-stage combustion. The primary requirement for achieving satisfactory combustion with minimum excess air is good air/fuel mixing in a properly designed combustion chamber. Minimizing excess combustion air can reduce NOx emissions by as much as 10-15% if the normal excess air level is relatively high (about 50%). Flue gas recycle can reduce or eliminate the thermal component of NOx provided the flue gas is thoroughly mixed with combustion air in the windbox. Injecting recycle directly into the firebox has little or no effect on NOx emissions. Flue gas recycle is capable of reducing or eliminating the thermal NOx component with liquid fuel combustion, but it does not affect the fuel NOx component. Two-stage combustion is capable of giving the greatest reduction in NOx emissions, but would probably be the most difficult to apply to an industrial boiler. Two-stage combustion is capable of reducing both fuel NOx and thermal NOx from fuel oil combustion.

33106 **APTIC NO, 55572**

Slack, A. V. and H. E. Elder

IMPACT OF POLLUTION-RELATED SULFUR RECOVERY ON THE FERTILIZER INDUSTRY. *Preprint, American Chemical Society, Washington, D. C., 20p., 1973. 3 refs. (Presented at the American Chemical Society, National Meeting, 166th, Chicago, Ill., Aug. 26-31, 1973.)*

The impact of pollution abatement sulfur or sulfur recovered in one form or another to reduce sulfur oxide emission from power plants and industrial operations on the fertilizer industry is discussed. Projection to quantify the impact is difficult. One projection indicates that until about 1985 more abatement sulfur will be discarded than recovered, by 2010, over 17 million long tons of S will be removed from stack gases (or from raw materials) and 10 million tons of this will enter the S market, and the amount recoverable will exceed the demand until 1975-1980 and after 1990. The form in which the S is recovered (elemental S, sulfuric acid, ammonium salts) is also important. Not enough information is available to evaluate the relative positions of S and acid. The impact of ammonium salts will be mainly in treating tail gas from H_2SO_4 units in phosphoric acid plants. Various SO_2 removal processes are mentioned. (Author summary modified)

33107 **APTIC NO. 55658**

Spira, Joh.-Chr.

HYBRID DRIVE IN PASSENGER CAR TESTED. COMBINATION OF COMBUSTION ENGINE WITH ELECTRIC MOTOR - BOTH OPERATE AT HIGH POWER DEMAND. *(Hybridantrieb im Personenwagen erprobt. Verbund zwischen Verbrennungs- und Elektromotor- Bei hohem leistungsbedarf arbeiten beide Motoren). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 27(43):13, Oct. 1973.*

A combined electric motor and combusion engine were tested in a passenger car. In this case the combustion engine is not only used for charging the battery, but also for driving. The electric motor and the combustion engine are connected with each other by a friction clutch. The car is electrically started. When it reaches a speed of 30 km/hr the electric motor starts the four-cylinder four-stroke engine. This principle combines pollution-free operation in city traffic with the possibility of driving the car over long distances. The nominal voltage of the d.c. motor is 144 V, its nominal power 16 kW, and the starting power 32 kW. Combustion engines and electric motors rotate with a maximum of 6500 rpm. The maximum speed with which the car can be driven is 110 km/hr.

33108 **APTIC NO. 55746**

Stoy, Bernd

EFFICIENT USE OF ENERGY: WHY, WHERE, HOW? (Sinnvolle Energieverwendung: Weshalb, wo, wie)? Text in German. Umschau (Frankfurt), 73(19):581-587, 1973. 5 refs.

Reduction of energy consumption will decrease pollution and cause energy resources to meet demand. Energy can be saved through turning down the room heat from 25 C to 20 C, reduction of the speed of long-distance traffic, better heating insulation of homes and buildings, and extensive heat recovery in industry and households. Illustrated examples of the latter are given. In cement production, heat could be recovered from coarse cement for preheating the combustion air. In addition heat could be recovered from the waste gases for preheating the crude material. In households, heat could be recovered from the waste heat of refrigerators and be used for water heating, or the warm waste air from a laundry drier could be returned to the drying process. A drastic reduction of the energy consumption could be achieved using the waste heat from laundry washers and the dishwashers for water heating.

33109 **APTIC NO. 57064**

Sugawara, F.

ABSTRACTS OF ARTICLES IN PREVENTION OF INDOOR AIR POLLUTION (PARTICULATE MATTER) IN ARCHITECTURE (3) (1964-1968). *(Kenchikugaku ni okeru shitsunai kuki osen (fuyu jin ai) boshi ni kan-suru bunken shoroku (3)). Kuki seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(7):33-47, Jan. 1973. Translated from Japanese, 67p.*

Thirty-four abstracts related to the prevention and control of indoor particulates are presented from the following publications of the Architectural Institute of Japan: Collected Monographs and Reports of the Architectural Institute of Japan (Nippon Kenchiku Gakkai Ronbun hokoku shu); Research Reports of the Architectural Institute (Kenchiku Gaddai Kenkyu hokoku); and research meeting sponsored by the local branches.

33110 **APTIC NO. 57033**

Tamalet, Michel and Gerard Chrysostome

DESULFURIZATION OF FUEL IN PROCESS OF COMBUSTION. *(Procede de desulfuration du fuel en cours de combustion). Chemie Actual., no. 20:56-58, June 1973. Translated from French, 10p.*

A fluidized bed desulfurization process for liquid fuel is described. The process is currently at the laboratory stage but appears to be promising on the economic plane with an expected efficiency of 95%. The first phase involves a very incomplete combustion (30% of stoichiometric air) in a fluidized powdery medium formed by particles of calcium carbonate or dolomite which retain the sulfur in the form of calcium sulfide. The particles are then regenerated in a second fluidized bed where the sulfur is freed in the form of hydrogen sulfide in a concentration sufficient to be treated in Claus type units. The temperature in the first fluidized bed is slightly below 300 C, and the reactor is dimensioned so that the air of fluidization consititutes 25-30% of the air necessary for complete combustion. The so desulfurized products of gasification are then directed without being cooled toward a boiler where the combustion is completed. The only technological problem appears to be the circulation of particles between the fluidized bed of gasification and that of regeneration. The costs of the overall process are given in detailed tabular form and consist mainly of amortization of the material.

33111 **APTIC NO. 55676**

Tohgoh, Hiroshi, Hideto Ohno, and Hajime Tanaka

THE ADSORPTION CHARACTERISTICS OF JAPANESE COLLOIDAL EARTH (ALLOPHANE) FOR AIR-SO2 SYSTEM WHEN USED IN FIXED BED. *(Koshitsudo (arofen) koteiso ni yoru nisanka io no kyuchaku tokusei). Text in Japanese. Nippon Kagaku Kaishi (J. Chem. Soc. Japan), no. 10, 2021-2027, Oct. 1973. 5 refs.*

The adsorption by granulated earth of 2000 ppm sulfur dioxide from the air-SO2 system was studied, and the results compared with those for adsorbents such as silica gel, alumina gel, and activated carbons. The adsorption isotherm of the SO2 gas-air system was of the Freundlich type, with specific relationships between the concentrations of SO2 gas and the adsorbed amount of SO2 gas being found for each colloidal earth. Specific relationships were also found between the R sub c number and (H.T.U.) sub OG for each colloidal earth. The different behavior exhibited by the two colloidal earths can be ascribed to a difference in their ferric oxide contents. It is inferred that the surface of Terauchi colloidal earth consists of alumina gel because its breakthrough curve resembles that of alumina gel. The large adsorption capacity of Imaichi colloidal earth can be ascribed to the presence of removal Fe2O3 gel on it. Both colloidal earths, particularly Imaichi colloidal earth, are useful for the desulfurization of the SO2-air system.

33112 **APTIC NO. 55755**

Tominaga, H. and T. Kunugi

CHEMISTRY AND TECHNOLOGY IN CRACKING AND GASIFICATION OF PETROLEUM RESIDUES. *(Sekiyu no keishitsu ka to sono gijutsu). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst. Tokyo), 16(10):815-824, Oct. 1973. 30 refs.*

Cracking and gasification of heavy oil were studied. High temperature partial oxidation gives lower caloric gas, so it is used for the production of carbon monoxide and hydrogen, rather than fuel gas; high caloric gas may be obtained by the coexistence with a water gas reaction. Steam reforming may be applied for this purpose. High temperature thermal cracking gives mainly olefins. Hydrocracking gives a great deal of low molecular products, although raw material may be restricted by carbon residue. The coking process can produce clean fuel by removing asphalten in vacuum distillation residual oil as coke, which is gasified at high temperature partial oxidation; the produced gas is desulfurized. High sulfur coke must be gasified. Other types of cracking and gasification are mentioned.

33113 **APTIC NO. 55689**

Urlaub A. and E. Mueller

EXPERIMENTAL AND THEORETICAL INVESTIGATIONS INTO THE QUESTION OF THE EXHAUST GAS CHARACTERISTICS OF M-DIESEL ENGINES. *Automobiltech. Z. (Stuttgart), 75(10):351-357, 2-6, Oct. 1973. 4 refs. (Presented at the CIMAC Congress, Washington, D. C., 1973.)*

Present diesel engines have exhaust gas emissions which fall within the 1973 USA limits. With regard to the 1975 limits, this only applies to the carbon monoxide emission. On three different types of diesel engines, the influence of injection timing, exhaust gas return, as well as the combination of exhaust gas turbocharging, delayed injection, and exhaust gas return were studied. Without any deterioration to the lower torque characteristic and the maximum torque and without an increase of the specific fuel consumption, an oxides of nitrogen value of 5.2 g/HPh can be achieved through an ignition delay which is restricted to the upper speed range, i.e., an injection delay controlled by the number of rpm of 11 degree crank angle. This leaves the CO and hydrocarbon emission practically unchanged. The maximum power and the specific fuel consumption at the point of nominal power are negatively influenced by 10%. Similar results with regard to emission, and the negative effect on soot and fuel consumption values, were achieved with the much more complicated method of exhaust gas return. Through the combined action of turbocharging, injection dalay, and exhaust recirculation, the emission of oxides of nitrogen could be reduced to as little as 1.6 g/HPh. The leading problem of NOx emission with direct-injection diesel engines can be theoretically analyzed with a relatively simple calculation model derived from a study of the various influencing parameters of the NO emission and based on the assumption that burning or burned parts of the mixture are not mixed with fresh air. Furthermore, it was assumed that the combustion air-ratio remained constant in all reaction zones during that phase of the combustion process decisive for NO formation, and that the local air-ratio is a function of the average air-ratio with regard to the entire air quantity in the combustion chamber. A comparison of the measured and calculated results obtained to date indicate that the theoretical observations are a very useful help for arriving at optimum emission conditions.

33114 **APTIC NO. 55578**

Waeschle, Franz

DUST FILTER TUBE CLEANER. *(Blasvorrichtung zum Abreinigen von Filterschlaechen in Staubabscheidern durch Druckluft im Gegenstromverfahren). Text in German.*

(Waeschle Maschinenfabrik GmbH, Ravensburg (West Germany)) W. Ger. Pat. 1,607,766. 4p., March 8, 1973. 1 ref. (Appl. March 2, 1967, 4 claims).

A dust filter tube cleaner using a compressed air nozzle for reverse flow cleaning is described. The compressed air supply via a programmed or demand operated valve is connected to the upper part of the nozzle assembly divided from the lower half by a transverse septum. The nozzle assembly, of smaller diameter than the filter tube, is inserted into its mouth through the mounting flange. Above and below the septum, rows of holes are drilled in the walls of the nozzle assembly and are normally covered by a flexible hose fixed by clips above the upper row and below the lower. When a compressed air blast is fed to the upper half, the tube is deflected outwards into a bowed profile obturating the annular channel between the nozzle and flange, through which filtered air normally passes. At the same time both rows of holes into the interior of the sleeve are opened forming a through passage for the cleaning air into the nozzle proper.

33115 **APTIC NO. 55592**

Watari, Shinjiro, Tsutomu Kato, and Mitsuo Kobayashi

MANUFACTURING METHOD OF SPHERICAL ACTIVE CARBON. *(Kyukei kasseitan no seizohoho). Text in Japanese. (Agency of Industrial Science and Technology, Tokyo (Japan)) Japan. Pat. Sho 48-27595. 4p., Aug. 23, 1973. (Appl. March 19, 1969, 1 claim).*

A method for manufacturing spherical active carbon is presented. Coal crushed to 0.5-8.0 mm is fed into a reaction drum. Air is injected and the coal is heated or cooled to maintain the temperature at 300-450 C. Coal remains in the drum for 10-60 min. Oxygen adsorbed by the coal reacts with carbon and hydrogen to produce carbon monoxide, carbon dioxide, and steam which are discharged. Oxygen remaining in the form of oxides is far less than that of similar activation processes performed at 300 C or lower. The surface area expands and gas-gas and gas-liquid reactions of the carbonization gas and tar produced from the coal are accelerated. The manufacturing method eliminates the conventional carbonization process.

33116 **APTIC NO. 55536**

Weickmann, F., H. Weickmann, K. Fincke, F. A. Weickmann, and B. Huber

COMBUSTION GAS CLEANING PROCESS. *(Verfahren und Vorrichtung zur Reiningung von Verbrennungsabgasen). Text in German. (Assignee not given.) W. Ger. Pat. 2,118,066. 5p., Feb. 8, 1973. (Appl. April 14, 971, 5 claims).*

A combustion gas cleaning process which incorporates the introduction of a catalyst into the combustion air is described. The combustion gas is passed over units impregnated with a liquid catalyst and is vaporized into the air. The units are of microporous material impregnated with carbonyl-methyl-cyclopentadienyl-manganese. They may be shaped as disks of optional thickness those diameter is proportional to the air volume, or they may be rod or tube shaped.

33117 **APTIC NO. 55593**

Yamaguchi, Takaaki

CONTROL TECHNIQUES OF HYDROCARBON VAPOR IN PETROLEUM STORAGE TANKS AND GAS STATIONS. *(Tankasuiso bepa no shorigijutsu, sekiyu choso oyobi gasorin sutando niokeru). Text in Japanese. Kankyo Sozo (Environ. Creation), 3(9):29-37, Sept. 1973.*

The emission of hydrocarbon vapor from petroleum storage tanks and gas stations is qualitatively described, and its control techniques are briefly given. The HC leak emission from storage tanks is classified into natural loss and operational loss. The natural loss is caused by temperature variations due to sunshine through ventilation pipes and gaps, and its amount is proportional to the capacity of the tank. The operational loss is caused during the filling of the tank and the transfer from the tank. In addition, the emission takes place during transportation. To prevent the emission, a vapor return process is applied, however application of this process is limited to fixed roof storage tanks. For floating roof tanks either the adsorption or condensation process is applied. All of these techniques can effectively treat a large amount of vapor, but require large plants and investments. For treatment of small quantities, attachment of the adsorbent to the emission outlet is considered. The vapor emission from gas stations is classified into emissions during transfer from a tank lorry to an underground storage, emissions during filling of an automobile fuel tank, and natural losses of the underground storage tank. Except the emission during the filling of fuel tanks, the vapor return, condensation or adsorption processes are considered to control the emissions.

33118 **APTIC NO. 55756**

Yamamoto, T.

USE OF METHANOL AS FUEL. *(Metanolu no nenryo ka). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst., Tokyo), 16(10):825-828, Oct. 1973.*

Methanol can be used as a raw material to produce hydrogen which can be used as a fuel. Steam, rather than fuel, is used to reform the hydrocarbons. Methanol can also be used as the fuel for fuel cells. Methanol can be used as a boiler fuel under special conditions. When 30% methanol is added to gasoline, carbon monoxide in the exhaust gas can be eliminated and the temperature lowered, thus stopping knock. Although the poor solubility between methanol and gasoline has prevented methanol s use for this purpose, the problem may be solved in the future. Methanol may be used to synthesize protein and to produce town gas if it is methanized.

33119 **APTIC NO. 55615**

Yoshida, Tetsuo, Yasuo Mukaizaka, Kikuo Okuyama, and Taketoshi Yasumune

EXPERIMENT ON THE GROWTH OF PARTICLES BY COAGULATION AND CONDENSATION OF AEROSOLS. *(Earozoru no gyoshuku, gyoshu ni yoru ryushi seicho ni kansuru jikken). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 299-300, 1973. 2 refs. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

The complete separation and collection of fine aerosol particles of less than 1 micron seems to be difficult from the standpoints of the performance of the dust collector and economy. For this reason, on the basis that the growth of the aerosol particles should make easy the separation and collection operation, an experiment on the growth of particles by coagulation and condensation was tried, in which the growth of the particles occurred by nuclide condensation in the atmosphere of supersaturated steam and by Brown coagulation in a fog box. As a result, the effect of condensation on the growth of particles was very great and was very useful for pretreatment of the aerosol. In the case of the Brown coagulation, when the concentration of particles was lowered to about 1,000,000 particles/cu cm during the same retaining hour, little growth was shown. The pretreatment of aerosols only by coagulation is not as effective unless the concentration of particles is particularly high.

1972

33120 **APTIC NO. 55397**

BASIC HOT-BLAST CUPOLA AT GKN DOWLAIS. *Foundry Trade J. (London), 133(2901):35-43, July 13, 1972.*

A basic hot-blast cupola capable of supplying the requirements of an ingot-mould foundry is described. The plant consists of two water-cooled cupolas, a gas cleaning plant, and twin recuperators. The gas cleaning plant consists of a saturator, venturi scrubber, and a separator. The cupola gas is drawn through the take-offs (so that nil pressure is maintained at the charging level) at a temperature of 250-350 C by two high-energy fans capable of displacing 19,600 cu ft/min against a pressure drop of 59 in on the suction side. Water introduced at the top of the saturator reduces the temperature of the gas to 50-70 C. and removes the coarser material drawn through the take-offs. The material is carried by the saturator water to a sludge tank which also acts as a gas seal and then flows to settling ponds. The cupola gas is then drawn through a venturi scrubber and is accelerated through a water curtain into the separator where the wetted particles settle out and are flushed to the sludge tank. The clean cupola gas, containing 16-20% carbon monoxide and 12% steam, is then introduced into the combustion chambers, mixed with secondary air, and burned to give combustion chamber temperatures of 950-1050 C. It is not necessary to use a system of shot-cleaning in order to maintain the efficiency of the recuperators as a result of prior cleaning of the gas.

33121 **APTIC NO. 57034**

Abalakova, D. Ya.

THE EFFECTIVENESS OF SEVERAL HEALTH MEASURES IN THE ELECTROLYTE SECTION OF A ZINC PLANT. *(Effektivnost nekotorykh ozdorovitel nykh meropriyatiy v elektrolitnom tsekhe tsinkovogo zavoda). Gigiena Truda i Prof. Zabolevaniya, no. 16:42, 1972. Translated from Russian, 4p.*

Measures which have been implemented in the electrolyte section of a zinc plant to reduce worker exposure to vapors of sulfuric acid, manganese, aresenic, chlorine, and lead are outlined. Rolled and fluted anodes have been put into use to increase the working life of the Pb-Ag anodes, and extract of soapwort has replaced licorice to achive reduction in the release of harmful substances from the surface of baths. Metallic troughs have been replaced with vinyl plastic, and Zn pouring has become mechanized. Introduction of Mn into solution, via a unit for pulverizing Mn, and increase in ampere and acid loads have also reduced air pollution at work sites. Open reverberatory furnaces have replaced the induction-type, the slag section has been remodeled, and a new room has been equipped with an anode workshop. Six exhaust and two intake systems have been constructed to improve ventilation. The measures have reduced concentrations of harmful substances and liquidate cases of acute Cl2 and Pb poisoning.

33122 **APTIC NO. 55525**

Burge, Harland L., Lidia Manson, Willian Lawler Doyle, and Robert Stanley Hawthorne

NITROGEN OXIDE REMOVAL FROM WASTE GASES. *(Verfahren und Vorrichtung zum Reinigen von Gasen). Text in German. (TRW, Inc., Redondo Beach, Calif.) W. Ger. Pat. Appl. 2,238,883. 16p., Aug. 7, 1972. (12 claims).*

Nitric oxide was removed from gases by passing the gases through a sieve wetted continuously with a foaming and washing agent. The NO-containing liquid was removed after collapse of the foam. Approximately 95% NO was removed from nitrogen containing 0.042 and 0.324% NO by foam treatment with saturated aqueous ferrous sulfate containing a detergent.

33123 **APTIC NO. 55529**

Clemens, David Henry and Robert Kunin

REMOVAL OF SULFUR TRIOXIDE AND MISTS OF SULFURIC ACIDS. *(Verfahren zum Entfernen von Schwefeltroixid und oder Schwefelsaeure-Nebel aus gasfoermigen Stroemen). Text in German. (Rohm and Haas Co., Philadelphia, Pa) W. Ger. Pat. Appl. 2,229,675. 13p., June 19, 1972. (16 claims).*

The removal of sulfur trioxide and mists of sulfuric acids from the waste gas in H2SO4 manufacturer is described. The gas contained 17.5 ppm SO3 and H2SO4, calculated as SO3. The gas at 75-85 degrees is passed through a macroreticular resin containing 91% 4-vinylpyridine crosslinked by approximately 7% divinylbenzene, and balance ethylvinylbenzene of particle size 20-70 mesh, porosity 0.59 ml/ml, and surface area approximately 6 sq m/g. The SO3 capacity of the resin was greater than or equal to 7 mequiv/g.

33124 **APTIC NO. 55545**

Deniso, V. V.

POSSIBILITY OF THE USE OF VANADIUM CATALYSTS IN FLUIDIZED BED FOR THE REMOVAL OF SULFUR DIOXIDE FROM GASES. *(Vozmozhnost primemeniya vanadiyevykh katalizatorov v kipyashchem sloye dlya ochistki gazov ot SO2). Text in Russian. Khim. Prom. (Moscow), 48(4):309, 1972. 2 refs.*

The efficiency of vanadium catalysts in a fluidized bed in the conversion of sulfur dioxide into sulfur trioxide was investigated in dynamic experiments, applying a volume rate of 13,000/hr, and a temperature range of 400-550 C. The initial SO2 concentrations were between 0.3 and 1.2%. The average diameter of the catalyst granules was 1 mm. Reduction in the rate of conversion, and shift of the maximum rate of conversion toward higher temperatures with increasing SO2 concentration were observed. The highest rate of conversion determined for 0.3% concentration was at 475 C with 94%, while the highest rate of conversion for 1.2% concentration (90%) was at 525 C. The activation energies ranged from 8 to 11 kcal/mol, much lower than those determined for vanadium catalysts in stationary layer. Vanadium fluidized-bed catalysts are superior to stationary layer catalysts for the removal of SO2 from waste gases.

33125 **APTIC NO. 55534**

Diepenbrock, Alfred Erich Wilbrandt van

PURIFICATION OF AIR. *(Verfahren und Vorrichtung zur Reinigung eines Gases). Text in German. (Bronswerk-Apparatenbouw N. V., Nijkerk (Netherlands)) W. Ger. Pat. Appl. 2,235,561. 19p., July 20, 1972. (17 claims).*

Solid, liquid, and gaseous impurities were removed from an air flow by contact with a water mist of droplet size less than 20 micron. The mist was produced by an atomizer with nearly complete transfer of the impurities to the mist. The mist contacted large water drops and separated the purified air flow from the liquid.

33126 **APTIC NO. 55681**

Eberan-Eberhorst, Robert, Duesan Gruden, and Gerd Schwarzbauer

THE EXHAUST EMISSION OF THE OTTO ENGINE IN KNOCKING COMBUSTION. *(Die Abgasemission des Ottomotors bei klopfender Verbrennung). Text in German. Erdoel Kohle (Hamburg), 25(12):715-718, Dec. 1972. 4 refs.*

The influence of air:fuel ratio, compression ratio, and ignition advance on engine knock and exhaust emissions was investigated for an ASTM-CFR-Test engine (MOZ) using a standard knockmeter with a range of 0-100. Combustion temperatures increased with knock as did nitrogen oxide emission. Hydrocarbon emission was lower with knock. Changes in air:fuel ratio, ignition, and compression also caused knock, with the latter change having the most profound effect. Emission of hydrogen cyanide, formaldehyde, and ozone increased rapidly with knock, producing a stronger exhaust odor.

33127 **APTIC NO. 55549**

Fedor, Robert J. and Cameron S. Ogden

CATALYTIC MATERIAL FOR REDUCING NITROGEN OXIDES CONTAINED IN INTERNAL COMBUSTION ENGINE EXHAUST GASES. *(Kayalysatormaterial fuer* *die Reduktion von Stickoxiden aus Abgasen von Verbrennungskraftmaschinen). Text in German. (Gould, Inc., Cleveland, Ohio) W. Ger. Pat. Appl. 2,226,608. 17p., May 31, 1972. (10 claims).*

The preparation of catalytic material for reducing nitrogen oxides contained in internal combustion engine exhaust gases is described. The catalysts are constructed from perforated metal sheets, such as expanded metal, less than 25 micron thick in which the surfaces of the web ribs are inclined to the plane of the sheet. Sheets with different aperture size may be used either in layers or in hollow or core wound spirals with length to diameter ratios of 0.5-3.0 to 1.0. The surface may be 13-104 sq cm/g.

33128 **APTIC NO. 55562**

CATALYST FOR REDUCING NITROGEN OXIDES CONTAINED IN INTERNAL COMBUSTION ENGINES EXHAUST GASES. *(Katalysator fuer die Reduktion von Stickoxiden, insbesondere aus Abgasen aus Verbrennungskraftmaschinen). Text in German. (Gould, Inc., Cleveland, Ohio) W. Ger. Pat. Appl. 2,226,551. 22p., May 31, 1972. (11 claims).*

A catalytic structure for reducing nitrogen oxides, especially from exhaust gases of internal combustion engines, is described. Is comprises a carrier substrate on one side of which a catalyst layer is metallurgically combined. The composition of the layer differs from that of the substrate. The carrier may be an expanded metal sheet less than 0.25 mm thick containing nickel or cobalt 80% and chromium 20%. The catalytic layer may contain Ni 80% and Cu20% and constitute 0.5-50 wt% of the catalytic structure.

33129 **APTIC NO. 55392**

Greenfield, Charles

TURNS WASTE INTO FUEL. *Food Eng., 44(5):120-122, May 1972.*

A pollution control system which uses oil to fluidize food plant wastes such as sludge and slurries has been developed which is free from air or stream pollution and which produces dry, sterile solids which can be burned as boiler fuel or sold as feed. The system consists of three basic components: a fluidizing tank, an evaporator, and a centrifuge. The heart of the system is its quadruple effect evaporator that evaporates water from the sludge and slurries. Oil is added to the feed to deep the product in a fluid state during and after evaporation. The oil is eventually separated from the solids with a centriguge. The overall evaporator heat efficiency is over 85%, and this combined with the multi-effect efficiency results in a highly economical system. A steam turbine driving the centrifugal circulation pump for the drying stage further reduces the energy requirements. A flow sheet of the process is included.

33130 **APTIC NO. 55523**

Hundhausen, Eckhard, Hans-Georg Boehm, and Claus Christian Cobarg

ELECTROSTATIC FILTER. *(Elekrostatisches Filter). Text in German. (Braun AG, Frankfurt (West Germany)) W. Ger. Pat. Appl. 2,234,179. 13p., July 12, 1972. (11 claims).*

An electrofilter for the purification of air in living rooms and workrooms is described. It contains at least one electrode coated with an adsorbent at corrugated supports between the electrodes impregnated or coated with absorbents. Oxidizing or reducing agents for deposition or conversion of the impurities are included. The supports were optionally wound to form filter shells which passed the air along the folds to give increased air throughput and improved filtering efficiency.

33131 **APTIC NO. 55516**

Jones, Charles

A SURVEY OF CURTISS-WRIGHT S 1958-1971 ROTATING COMBUSTION ENGINE TECHNOLOGICAL DEVELOPMENTS. *Preprint, Society of Automotive Engineers, New York, 22p., 1972. 26 refs. (Presented at the Society of Automotive Engineers, National. Automotive Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720468.)*

The highlights in the development of the rotating combustion (RC) (Wankel) engine at Curtiss-Wright Corp. are summarized. Speculations regarding remaining directions, both within and out of the framework of previous explorations are included, along with a description of the technical features of the engines used in the commercial applications of other licensees. An attempt is also made to span the gaps left by previous publications and to expand the material which was considered proprietary earlier. Design features, testing, and ramifications of the RC1-60 rig engine are examined in detail. The application of the fundamentals and principles of the RC engine to automotive, aircraft, and small, air-cooled engines is also described. With regard to pollutant emissions, the RC engine produces 1/5 to 1/2 the amount of oxides of nitrogen of automotive engines. Untreated engine hydrocarbon and carbon monoxide levels for the RC2-60 are in the same range as precontrol automotive engines. The RC stratified charge engine is mentioned. (Author abstract modified)

33132 **APTIC NO. 55384**

Jull, N. A.

PARAMETERS FOR CYCLONE SELECTION. *Can. Mining J., 93(6):37-43, June 1972.*

Parameters affecting hydrocyclone selection and separation are presented along with some useful mathematical relationships and comments on elutriation devices. Equations which define separation relate all of the geometry (diameters of the cyclone, vortex finder, and inlet), though they less often include apex diameter which is important. The preferred method presented is to draw a curve of the separation versus vortex finder diameter, then select the suitable cyclone, inlet, and apex sizes to match. Part of the convenience in first selecting the vortex finder is that a cyclone shell can be chosen which will accommodate vortex finder sizes both larger and smaller than that desired, thus ensuring future flexibility. The most difficult parameter to select is apex diameter; in apexes under 2 in. diameter the air inlet becomes more significant and its share of the total apex cross-sectional area depends very much on the volume and rpm of the overflow which is acting as an air pump. Operating conditions which influence separation are viscosity of the overflow stream, coarseness of the solids fed into the cyclone, and concentrations of solids in the feed. The effect of all three factors tends generally to increase with increasing volume percent solids. Elutriation devices are generally not recommended except where close operator control and/or very steady feed conditions are assured. These devices have some coarsening effect on separation and necessitate some compensating changes in the cyclone geometry.

33133 **APTIC NO. 55595**

Kobayagawa, Takashi

PROBLEMS IN A CATALYTIC EXHAUST CONVERTER. *(Shokubai joka sochi ni kansuru shomondai). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(7):67-77, July 1972. 2 refs.*

The need for the problems of a catalytic exhaust converter for automobiles are discussed. The Muskie law and techniques to control emissions to the legal limits are mentioned. Air pollution in general, photochemical smog, and carbon monoxide concentrations in Tokyo are discussed. Both engine operation modifications and engine design modifications must be used to control pollution. Catalytic converter temperature, space velocity, catalyst poisoning, oxygen supply, CO concentration, and ammonia evolution are problems to be solved. The converter would decrease power and fuel economy and possibly cause secondary pollution.

33134 **APTIC NO. 55341**

Kosugi, Eiichi

CHEMISTRY OF GASIFICATION-DESULFURIZATION. *(Gasuka datsuryuho no kagaku). Text in Japanese. Sekiyu to Sekiyu Kagaku (Petrol. Petrochem.), 16(10):18-22, Oct. 1972.*

Fuel oil gasification is discussed. Presently only 1.5-1.3% and 1.0% oil desulfurization can be achieved by the indirect and by the direct methods, respectively. Gasification is a combination of an indirect method and a fluid coker using a coke gasifier. It eliminates sulfur contained in the asphalt component of the heavy oil to improve the degree of desulfurization by the indirect method. The oil coke from asphalt is burned to coke gas by a coke gasifier and then sulfur is removed to produce low-sulfur fuel gas. The method can successfully treat oil with a high carbon and metal content. It can produce low-sulfur and low-nitrogen fuel oil and fuel gas. It can be continuously operated for 2 years, in contrast to the direct method which has difficulty keeping the catalyst activity high for that long.

33135 **APTIC NO. 55543**

Leytes, I. L., O. P. Sichkova, and A. F. Shinelis

REMOVAL OF CARBON DIOXIDE FROM GASES BY MEANS OF MIXTURES OF MONOETHANOLAMINE WITH ORGANIC SOLVENTS. *(Ochistka gazov ot dvuokisi ugleroda smesyami monoetanolamina s organicheskimi rastvoritelyami). Text in Russian. Khim. Prom. (Moscow), 48(4):263-266, 1972. 20 refs.*

Possibilities of the reduction of the amount of heat necessary for the adsorption, desorption, and regeneration processes in the removal of carbon dioxide from gases by means of monoethanolamine solutions were studied. The total or partial substitution for water as a diluent for monoethanolamine by organic solvents with reduced enthalpy and with increased physical solution capacity for CO2 was the most efficienct way of reducing the heat expenditure. The total heat expenditure could be reduced by 1.5 to 2 times through the use of monoethanolamine in non-aqueous media under atmospheric pressure, and by 2.5 to 3 times under 30 atm pressure. The residual CO2 content in nonaqueous solutions of monoethanolamine following regeneration was lower in aqueous solutions. Certain organic solvents, especially alcohols, substituted amides, five-member heterocyclic compounds with a nitrogen atom in the ring, and some glycol ethers are suitable for use as diluents for monoethanolamine, while ketones and furfurol are inefficient. It was possible to reduce the expenditure for CO2 absorption under atmospheric pressure to 1200 kcal/cu m of CO2.

33136 **APTIC NO. 55464**

Liu, Han, Gregory Theoclitus, and John R. Dervay

INCINERATION OF HIGH BTU SOLID WASTE AND ITS APPLICATIONS. *American Society of Mechanical Engineers, New York, Proc. Natl. Incinerator Conf., New York, 1972, p. 347-353. 3 refs. (June 4-7.)*

The development and application of a high Btu solid waste incinerator based on the controlled combustion principle are discussed. The incinerator is designed to batch burn solid waste containing 20-100% plastics or other high Btu materials without the use of auxiliary air pollution control devices. The combination of a chamber air modulation system and a properly selected afterburner modulation system are the features that a high Btu incinerator specifically requires in addition to that of the controlled air design. A continuous air modulation system is installed to modulate the chamber air and is controlled by a thermocouple located in the stack. When the stack temperature increases, the air supply decreases. A similar modulation system for the afterburner fuel is also installed. The burner is modulated between maximum and minimum fuel limits. When the stack temperature decreases, the afterburner heat generation increases. The controlling points for afterburner may be set lower than that for the chamber air to economize fuel consumption whenever possible. The burner capacity may be so selected that it is capable of preheating the stack to the same temperature level as required for clean incineration of the high Btu waste. The system behavior of the modified incinerator when batch burning the same high Btu waste is shown. Stack emission measurements for applications of incinerating diesel engine oil filters and polystyrene foam wastes are presented.

33137 **APTIC NO. 57051**

Maizza, Vito

NONCONVENTIONAL TWO PHASE CYCLES IN AUTOTRACTION. *(Sull impiego in autotrazione di cicli a fluido bifase non convenzionale). Termotecnica (Milan), vol. 2:71-83, Feb. 1972. 18 refs. Translated from Italian, 31p.*

The thermodynamic aspects of steam propulsion and the applicability of aerospace technology to the development of a steam-driven automobile as an alternative to the relatively polluting internal combustion engine motor vehicle are presented. Problems related to the choice of parameters for operating cycles are discussed, and it is shown that pressure and temperature values within a narrow range are the most satisfactory for such application. Working fluids which allow high efficiency of operating cycles and which exhibit rapid vaporization are considered with an analysis of their thermodynamic characteristics. Efficiencies of cycles using such working fluids are calculated and the results graphically illustrated. Condensation pressures and temperatures are considered in relation to the range of operation necessary to attain an advantageous combination of weight, size, and costs. The only serious problem in implementation of steam powered automotive design appears to be the production of a small, efficient, and economical vapor generator. (Author abstract modified)

33138 **APTIC NO. 57052**

Maizza, Vito

UNCONVENTIONAL TWO PHASE WORKING FLUIDS CONDENSATION IN AUTOMOTIVE PROPULSION. *(Sulla condensazione di fluidi bifase non convenzionali per autotrazione). Proc. Natl. Cong. A.T.I., 27th, Naples, Italy. 1972. p. 39-73. (Sept. 27-29.) Translated from Italian, 69p.*

An exploratory study is presented on the condensation of unconventional working fluids for reciprocating and turbine vapor propulsion engines as less polluting alternatives to the internal combustion engine in automotive applications. The physical characteristics and heat conductance of these fluids are analyzed in relation to the laminar and turbulent condensate flow in vertical and horizontal tubes. Chlorobenzene and Freon 113 are better fluids than water in every respect due to their lower motion pressure loss. The merits of various possible condensation systems in relation to the most advantageous combination of weight, size, and costs are presented, and the effects of secondary phenomena and cooling air on the design of various components in an automotive condenser are analyzed. Refrigeration by air of organic fluids can be accomplished with relative economy and high efficiency, thus making them available for automotive propulsion and other industrial applications. (Author abstract modified)

33139 **APTIC NO. 55466**

Mills, R. G. and L. G. Desmon

OPERATING EXPERIENCE IN THE SUSPENSION BURNING OF WASTE MATERIALS IN CYCLONE INCINERATORS. *American Society of Mechanical Engineers, New York, Proc. Natl. Incinerator Conf., New York, 1972, p. 195-200. 2 refs. (June 4-7.)*

The technique of suspension burning for the incineration of general and industrial waste materials is described. Cycloburners have been built in sizes up to 3 ft in diameter by 6 ft in length and have produced volumetric heat releases of 800,000 Btu/hr/cu ft compared to values of 15,000 to 30,000 Btu/hr/cu ft for standard incinerators and boiler furnaces. Some of the waste fuel materials burned to date have been paper products including postage stamps, wood products including bark and planer shavings, and plastics including polyethylene. One hundred percent polyethylene scrap was burned continuously without the use of an afterburner, and the exhaust gas contained no carbon monoxide or visible smoke. Incineration of many combustible materials producing carbon dioxide and water vapor with no visible effluent has been reduced to practice. An economic analysis has shown the cost of a Cycloburner installation burning wood planer shavings that have a market value of $5.00/unit (200 cu ft instead of natural gas at 7 cents/therm (100,000 Btu) will be amortized in 1 yr.

33140 **APTIC NO. 55599**

Nakamura, Yoshiatsu and Kenya Sekina

MEASUREMENT OF THE CONCENTRATION OF DISCHARGED SMOKE. *(Haikien nodo no sokutei). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(10):141-149, Aug. 1972. 17 refs.*

The control of smokes from diesel engines and boilers and the structure of smoke measurement apparatuses are discussed. Smoke standards, smokemeters, measurement methods, instrumentation, and transmissometers are mentioned.

33141 **APTIC NO. 55406**

North, Robert L.

NINE YEARS WITH JET-ENGINED GENERATORS. *Combustion, 43(11):11-14, May 1972. (Presented at the American Society of Metallurgical Engineers, Spring Meeting, San Francisco, Calif., March 26, 1972.)*

Nine years of experience with 21 jet aircraft type gas turbines by the Hartford Electric Light Co. has demonstrated the reliability and economy of this alternate method for electrical power generation. The mean generating availability for all units is 99.3%, and a reliability of 93.1% has been obtained in 7831 requested starts. The heat rate of the units varies with the load, the average being 14,480 BTUs/kw/hr. Jet A-1 or JP-5 aviation grade kerosene is the preferred fuel, and the costs averages about 12.3 mils/kw/hr. Also, the fact that No. 6 low sulfur fuel is approaching the 65 cents range makes the jets more economical to run than some of the older fossil steam units. Start-up cost is under $5.00 per engine. Their fast start ability qualifies the jets for rolling reserve while shut down, where this classification of power must be available within 5 minutes. Maintenance falls somewhere between that given to turbines and that shown boilers and has averaged .52 mils/kw/hr for the 21 engines to date. Vibration appears to be the most serious maintenance problem.

33142 **APTIC NO. 55456**

Rayman, N. and Peter J. Scott

DESIGN OF A REFUSE INCINERATION PLANT FOR THE CITY OF COVENTRY, ENGLAND. *American Society of Mechanical Engineers, New York, Proc. Natl. Incinerator Conf., New York, 1972, p. 166-177. (June 4-7.)*

The design of a refuse incineration plant for the city of Coventry, England is described. An economic appraisal indicated that while sanitary landfill was initially more advantageous, growth in refuse requiring treatment led to its displacement by incineration as the most advantageous disposal method. A study was made of various possible sites for the plant and the effect which the selection of a particular site might have upon the operating efficiency and cost of the refuse collection system. The plant was sized to operate 12 shifts of 8 hr each/wk when dealing with the refuse that was predicted to require disposal 5 hr after commissioning date. The furnace and boiler system was based upon the Martin Reverse Acting reciprocating grate. Each of the grates is 3.76 m in width and 8.05 m in length incorporating 15 reciprocating steps. The designed burning capacity of each grate is 12 tons/hr when fired with refuse having a calorific value of 2800 kcal/kg. Economical and efficient arrangements for gas cleaning, ash handling systems, and building features are described. Contract arrangements included a series of interrelated contracts rather than a single package contract for the whole package. It is estimated that the likely total construction cost of the plant will be $6,350,000 giving a cost per installed hourly ton of $177,000 and per installed daily ton of $7350 in terms of values ruling at mid 1971.

33143 **APTIC NO. 55418**

Ritscher, Guenter and Manfred List

ECONOMY OF WET TYPE DUST SEPARATORS. *(Wirtschaftlichkeit von Bassabscheidern). Text in German. Giessereitechnik, 18(5): 155-159, May 1972. 16 refs.*

A cost-efficiency comparison for vortex, rotary, and venturi type wet dust separators, as well as tissue filters, is given. Abrasive quartz sand with 16% below 5 micron and 7% over 60 micron was used for the experiments. The separation efficiency of wet type separators was essentially determined by the energy consumption. Costs for wet type separators with a capacity of 10,000 cu m/hr and for abrasive dust are given. Electrostatic precipitators for low capacities are ruled out due to the specific costs being too high. When the efficiency of centrifugal separators is not sufficient, wet type and tissue separators are available. The costs of vortex and rotary type separators are lower than those of tissue filters, while the latter are superior to vortex and rotary separators in efficiency. Tissue filters or high-energy wet type separators are necessary for dusts of great dispersity, or for high purity cleaned gas. In such cases, the costs of tissue filters and wet type separators are comparable.

33144 **APTIC NO. 57062**

Tamalet, Michel and Gerard Chrysotome

DESULFURIZING OF FUEL OIL IN FLUIDIZED BEDS. *(Desulfurisation of fuel-oil en lits fluidises). Congr. Int. Genie Chim. Serv. Homme, Paris, France 1972, p. 1-6. 5 refs. (Sept. 3-9.) Translated from French, 12p.*

Fuel is desulfurized by fractionated combustion in a real fluidized-bed burner containing lime or magnesium carbonate. After combustion in a very reducing atmosphere (30% of the stoichiometric air), sulfur is fixed in the form of calcium sulfide or magnesium sulfide. The fluidized particles are then regenerated in a second fluidized bed and S is released in the form of hydrogen sulfide at a concentration sufficient to be converted into S in CLAUS-type units. Desulfurization efficiency is 95%. The particles retain the metal vanadium which, associated with sodium, contributes directly to the corrosion of the overheater pipes. Combustion in this process of stages reduces the formation of nitrogen oxides. Manufacturing costs are considerable, but the investments are lower than for most processes because only 25-30% of the products are treated in a single, short operation. Even at high pressure, the regeneration of the particles requires only very low rates.

33145 **APTIC NO. 55405**

Wiseman, N. and W. J. Douglas

OXIDATION OF HYDROGEN SULPHIDE IN A CORONA DISCHARGE. *AIChE Symp. Ser., 68(126):297-301, 1972. 8 refs.*

The oxidation of hydrogen sulfide in a corona discharge from fine wires by excited oxygen was investigated in order to assess the applicability of the method for reduction of hydrogen sulfide-rich Kraft pulp mill odors. Specific oxidation values fell within the range of 1-9 g/kwh and were independent of the hydrogen sulfide concentration and space velocity. The specific oxidation value was reduced by about one third when the water vapor concentration was increased from 10 to 10,000 ppm. The reaction was homogeneous, and the maximum rate of reaction per unit reactor volume was dependent on the interelectrode gap. An unexplained aging effect appeared to accompany the accumulation of sulfur deposits on nail points, and the effect was manifested by increases of up to 100% in the values of both specific oxidation and maximum power density. The economic potential of the method does not appear to be very high at first sight; calculations based on the sulfur losses from a typical pulp mill indicate that the cost of electricity alone would amount to some $5/ton of pulp for control of air pollution. Significantly higher values of specific oxidation, however, could be expected if it were to prove possible to obtain a stable electric discharge in which lower values of mean energy prevailed.

1971

33146 **APTIC NO. 55519**

Broecker, Franz-Josef, Lothar Riekert, and Matthias Schwarzmann

CUPRIC OXIDE-CONTAINING CATALYSTS FOR AFTERBURNING OF EXHAUST GASES. *(Verwendung CuO-haltiger Katalysatoren zur Nachverbrennung von Abgasen). Text in German. (Badische Anilin- and Dosaabrik AG, Ludwigshafen (West Germany)) W. Ger. Pat. Appl. 2,132,020. 11p., June 28, 1971. (2 claims).*

The preparation of cupric oxide-containing catalysts for afterburning of exhaust gases is described. The catalyst is made by thermal dissociation at 250-300 degrees of mixed crystals such as Cu2(OH)2CO3 or Zn5(OH)6(CO3)2. They are doped with aluminum prepared by adding solutions of metals at 90 degrees to a solution of NaHCO3 at 40 degrees and heat treated at 4-700 degrees. The catalyst is active at 200 degrees and does not lose effectivness with time. Such catalysts are proposed as a preliminary step or first catalyst in a multibed procedure.

33147 **APTIC NO. 55524**

Bug, Walter

PURIFICATION OF WASTE GASES FROM ALUMINUM MANUFACTURE BY FUSED SALT ELECTROLYSIS. *(Verfahren und Vorrichtung zum Auswaschen von Abgasen aus der Aluminiumgewinnung durch Schmelzflusselektroylse). Text in German. (Gebrueder Giulini GmbH, Ludwigshafen (West Germany)) W. Ger. Pat. Appl. 2,140,032. 9p., Aug. 10, 1971. (4 claims).*

The purification of waste gases from aluminum manufacture by fused salt electrolysis is described. The gases are scrubbed in an absorption apparatus containing filters with rotating sprayers. They are driven by the pressure of the scrubbing water to effectively remove gaseous fluorine compounds and dust 98.5 and 85%, respectively.

33148 **APTIC NO. 55558**

oq, Jacques

THE ACTIVITY OF THE FRENCH GAS INDUSTRY. *(Action de l industrie gaziere francaise). Text in French. Pollut. Atmos. (Paris), 13(no. special):19-21, Oct. 1971.*

Environmental advantages involved in the use of natural gas are discussed. Natural gas is by far the least polluting of all fuels. Its sulfur content is negligible compared to that of other fuels, solid or liquid. Natural gas firing practically does not generate dust emissions. The basic problem involved in the use of natural gas are nitrogen oxide emissions, which considerably increase with the increase of the unit capacity of the combustion equipment. While the specific NOx emissions from domestic heating equipment are in the order of magnitude of 100 g/kilotherm, those from industrial heating equipment and thermal power plants reach 400 g/kilotherm and 700 g/kilotherm, respectively. The use of natural gas in internal combustion engines results in a reduction of the carbon monoxide emissions by 90%, a reduction of the unburned hydrocarbon emission by about 67%, and an abatement of the NOx emissions by about 50%. The use of natural gas, either in compressed or liquefied form, is especially promising for mass transportation.

33149 **APTIC NO. 55566**

Duguet, J. -C.

THE PURIFICATION OF WASTE GASES GENERATED BY PAINTING OPERATIONS. *(L epuration des effluents de peinture). Text in French. Peintures, Pigments, Vernis, 47(12):686-688, Dec. 1971.*

Processes and equipment for the separation of paint and lacquer particles from the air of surface-coating shops are described. Purification by means of dry filtrating masses increasingly gives way to wet type, modern procedures, such as the nozzle system with wash liquid pulverization which has an efficiency of 99.5%, maximum. The cascade system has an efficiency in the same order of magnitude, notwithstanding it greatly facilitates maintenance compared to the nozzle system. The venturi system, providing liquid pulverization by the action of a high-speed gas jet, has an efficiency ranging from 99.5 to 99.9%. The vortex system, patented among others as Bullows Nopump, operates with saw-toothed plates, and generates wash liquid circulation by the fan draft. Its efficiency reaches 99.8 to 99.9%. The flocculants used in this system for the separation of the wash-out paint particles are highly basic, featuring pH values of 10.5 to 13 for the saponification of the paint particles.

33150 **APTIC NO. 55538**

Erren, Rudolf Arnold

WASTE AS TREATMENT AND AIR CONDITIONING. *(Vorrichtung zum Asscheiden von festen fluechtigen und gasfoermigen Bestandteilen aus Abfasen und Abluftmengen). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,1 9,719. 15p , Aug. 7, 1971. (6 claims).*

A method of removing solid, liquid, and gaseous components from waste gases and air is described. The gases are washed with water in a flow tube fitted with rotating conic nozzles with an aperture angle greater to or greater than 90 degrees, which are directed against the gas flow. The water jets from the rotating nozzles strike the tube wall and then disperse in the gas flow. The residence time in the tube was enhanced with respect to usual devices.

33151 **APTIC NO. 55457**

Harger, Herbert L.

METHODS USED BY TRANSIT MIX OPERATORS TO MEET AIR POLLUTION CONTROL DISTRICT REQUIREMENTS. *National Sand and Gravel Assoc. and National Ready Mixed Concrete Assoc., Silver Spring, Md., NSGA Circ. 111, NRMCA 135, 22p., April. 1971. (Presented at the National Ready Mixed Concrete Association and the National Sand and Gravel Assoc., National Conventions, San Francisco, Calif., Jan. 1971.)*

A state of the art report for sand, gravel, and ready mixed concrete operations is presented which deals with the control of dust that may become airborne in handling and batching cement, control of fugitive dust from vehicle movement in the plant area, and suppression of airborne dust from crushing, handling, and stockpiling aggregate. Photographs accompanied by descriptions are provided for baghouse dust collectors, cement storage silos, collecting troughs, plant enclosures, exit drapes, a telescoping shroud for the rear of mixers, a rubber shield for mixer trucks, material charging operations, and water and chemical dust suppression systems.

33152 **APTIC NO. 55570**

Janin, Robert

THE ACTIVITY OF ELECTICITE DE FRANCE. *(Action d Electricite de France). Text in French. Pollut. Atmos. (Paris), 13(no. special): 16-18, Oct. 1971.*

Measures taken by the French electricity generating industry in the air pollution control area, and the financial aspects of such emission control measures are outlined. Coal-fired power plants are equipped with electrostatic precipitators for dust separation. Such precipitators have now reached efficiencies of 99% and over, as compared with 95% 20 years ago. The cost of electrostatic dust separators for a 600,000 kW power plant is about $182,000,00. The increase in the unit capacity of thermal power plants has also resulted in reduced specific dust emissions. The amount of dust emitted per kg of solid fuel consumed is now one eighth of that emitted ten years ago. Oil-fired thermal power plants, though they emit practically no dust, release considerable amounts of gaseous pollutants, especially sulfur dioxide. Acid pollutants, including SO2, can be averted by the addition of ammonia to the combustion air prior to the air heater, or of dolomite at the stack base. The construction of high stacks results in effective dispersion of the pollutants. In case of emergency, thermal power plants are switched from regular fuel with 2-3% sulfur content to low-sulfur fuel. Air pollution monitoring stations have been set up near thermal power plants for permanent ground level pollutant concentration measurement.

33153 **APTIC NO. 55532**

Kawamoto, Kensuke, Tomoaki Tsuno, Teruo Namiki, and Fukuoka Kitakyushu

ANTIOXIDANTS FOR SULFITE SOLUTIONS. *(Antioxydationsmittel). Text in German. (Mitsubishi Chemical Industries, Ltd., Tokyo (Japan)) W. Ger. Pat. Appl. 2,243,201. 16p., Sept. 1, 1971. (11 claims).*

The preparation of antioxidants for sulfite solutions obtained by scrubbing sulfur dioxide containing waste gas is described. The oxidation of aqueous NaHSO3, sodium sulfite, KHSO3, and potassium sulfite solutions to sulfates was prevented by addition of the antioxidants (PhCHR)n C6h5-nOH (I, R equals Me or Bu, n equals 1-5), (m-RC6H40)3PO (II, R equals C6H13, C9H19, C18, H37), (RO)3P (R equals C8H17, C10H21, C18H37), or RCO2Ch2Ch(OH)CH2OH (R equals C8H17, C17H35, C22H45). A solution of 0.01 part II (R equals C6H19) in 0.01 part Me2CO was added to 200 parts aqueous solution consisting of Na2SO3 17, NaHSO3 15, Na2SO4 0.5, and H20 67.5%. After passing air at 3 l min through the solution for 3 hr, 156 parts of the resulting solution contained Na2SO3 16.75, NaHSO3 14.90, Na2SO4 0.89, and H20 67.46% vs. 15.50, 14.66, 2.63, and 67.21%, respectively, for a solution containing no antioxidant.

33154 **APTIC NO. 55652**

Kawazoe, Kunitaro

TESTS ON A SULFUR-REMOVING APPARATUS FROM DISCHARGED GASES. *(Haigasu datsuryu sochi no shikenteki kenkyu). Text in Japanese. Kenkyu Hokoku Shuroku, Kagaku-hen (Rep. Res. Grantees, Min. Educ., Chem.), no. 5:141-142, 1971. 2 refs.*

A joint study on removing sulfur dioxide from stack gases with activated carbon is described. The rate of oxidation was constant at first, but gradually decreased with the accumulation of sulfuric acid. The concentration of SO2 at the outlet of the activated carbon column was constant while the oxidation rate was constant. The period of constant sulfur removal was dependent on the volume velocity. The reduction by hydrogen was complete within 30 min at 200-250 C, and the mean SO2 concentration was 1-3%. Repetition of adsorption and regeneration did not affect the reduction rate but did decrease the oxidation rate. The adsorption equilibrium of SO2 indicated that it was easy to separate SO2 from an SO2/hydrogen mixture by the pressure swing method. The preferred adsorption pressure was 10 kg/sq cm between room temperature and 50 C.

33155 **APTIC NO. 55468**

Lancashire, R.

REMOVAL OF DUST AND FUMES FROM WASTE GASES. *Environ. Pollut. Manage., 1(1):29-31, Oct. 1971.*

A high-energy venturi scrubber known as the Bischoff annular clearance washer has proven to be very effective in the removal of dust and fumes from waste gases. The hearth of the system is an annular clearance washer which consists of a single large venturi tube in which an axially-adjustable displacement cone is fitted to form an annular gap with the venturi wall through which the dust-laden gases are accelerated to high velocity. Adjustment of the cone position allows selection of pressure drops between 50 and 3000 mm water gauge. The washer is particularly suited for washing out very fine particles of dust or fume since adjustability of the cross section of the gap enables the required relative velocity to be maintained, even when the volume of gas fluctuates. The energy requirement for the removal of dust from gas is provided for by the increase in velocity of the gas and by the water barrier established by means of sprays or similar devices. A notable feature of the Bischoff system is the use of large spray jets which have been proved robust and trouble-free even when operating with recycled washing media containing a high proportion of solids. Typical efficiencies obtained in plants using the system range from 90.3% for methyl mercaptan to 99.9% for sulfur dioxide and hydrogen chloride contaminants.

33156 **APTIC NO. 55531**

Martens, Theophile

APPARATUS AND METHOD FOR PURIFYING GASES CONTAINING AMMONIA AND HYDROGEN SULFIDE. *(Verfahren und Vorrichtung zum Reinigen von Gasen). Text in German. (N. V. Sidmar, Gent (Belgium)) W. Ger. Pat. Appl. 2,152,443. 14p., Oct. 21, 1971. (6 claims).*

An apparatus and method for purifying gases containing ammonia and hydrogen sulfide are described. The gases, especially coke oven gases, are purified by countercurrent washing is a spray of dilute, aqueous ferrous sulfate with the formation of ferric sulfide in an ammoniac solution, and with subsequent oxidation of the solution. The gases are brought into contact with the aqueous FeSO4 in several successive steps and part of the aqueous FeSO4 is recycled. The oxidation is carried out by a gaseous oxidant, e.g., air, and the product is recovered as solid sulfur. The installation comprises a vertical wash column with two separator chambers separated by a horizontal partition with a bypass, an inlet for the raw gas into the lower chamber with 2 sets of spray nozzles; an outlet in the upper chamber for purified gas, and a bubble separator; an outlet for spent FeSO4 solution, and a spray nozzle for fresh aqueous FeSO4; and oxidation column with upper and lower inlet and outlet for aqueous FeSO4; inlet for air under pressure, outlet for NH3, and a skimming device for removal of the solid S.

33157 **APTIC NO. 55565**

Milhau, A.

DUST SAMPLING IN GAS STREAMS. *(Prelevements de poussiere dans une veine gazeuse). Text in French. Techn. Moderne, 63(5):204- 206, May 1971. 8 refs.*

General theoretical and practical problems involved in dust sampling from gas streams are discussed on the basis of related French standards. High-precision dust sampling and determination is necessary for dust separation equipment now reaching efficiencies up to 99.5-99.9%. The efficiency of dry dust separators can be directly measured by weighing the dust leaving the dust separator, while wet type dust separators usually require the measurement of the input dust weight, as the measurement of the dust contained in the sludge is both delicate and difficult. The measuring section should provide uniformity of the flow rate, dust concentration, and composition of the gas to be sampled. The measuring section should be placed in the middle of a rectilinear conduit of a length equaling at least 6 to 10 times the hydraulic diameter. The principle of isokinetic sampling should be also observed. To avoid error in dust capture efficiency by the sampling probe, the tip wall thickness should be reduced as much as possible. However, wall thicknesses below 0.2 mm are not technically feasible.

The dust capture unit of dust samplers should be made of an absolute filter with respect to the dust suspended in the captured gas stream.

33158 **APTIC NO. 55539**

Nakamura, Harutoki and Jan Yagi

CATALYSTS FOR THE PURIFICATION OF AUTOMOTIVE EXHAUST GASES. *(Verfahren zur Herstellung eines Katalysators fuer die Abgasreinigung). Text in German. (Matsushita Electric Industrial Co., Ltd., Osaka (Japan)) W. Ger. Pat. Appl. 2,137,331. 17p., July 26, 1971. (8 claims).*

The preparation of catalysts for high carbon monoxide conversion from glass fabrics is described. The fabric is coated with cobalt, copper, chromium, nickel oxides, manganese oxides or platinum after either decreasing the alkali metal component of the glass or precoating the with an organic cobalt, copper, or chromium compound. When a catlayst was contacted with automotive exhaust gas, maximum CO conversion, approximately 100%, occurred at 350-450 degrees. There was a limit of heat resistance greater than or equal to 950 degrees. The reaction started at 100-10 degrees and stoped at 70-80 degrees.

33159 **APTIC NO. 55533**

Pokorny, Helmut, Wolfgang, Mumme, and Ernst-Helmut Philippi

REMOVAL OF NITROGEN OXIDES FROM WASTE GASES. *(Verfahren zur Absorption von nitrosehaltigen Abgasen). Text in German. (Veba-Chemie AG, Gelsenkirchen-Buer (West Germany)) W. Ger. Pat. Appl. 2,141,944. 18p., Aug. 21, 1971. (11 claims).*

Nitrogen oxides were removed from waste gases by absorption by crude phosphate, either by passing the waste gas after saturation with low pressure steam through a moving layer of coarse grained crude phosphate or by passing the dry waste gas through an aqueous suspension of fine-grained crude phosphate. The charged phosphates were useful for fertilizer manufacture. A waste gas containing 8.2 g nitric oxide/sq m was saturated with steam and passed at 360 cu m/hr 0.1 m/sec, and residence time 1.5 sec through a filter of surface area 1 sq m containing a 0.15 m thick Moroccan phosphate layer of grain size 0.5% greater than 5, 0.1% 4-5, 0.1% 3-4, 1.4% 2-3, 2.8% 1-2, 47.0% 0.2-1, and 48.1% less than 0.2 mm to give 85.3% absorption. The compaction of the phosphate was prevented by changing 50 kg phosphate/hr.

33160 **APTIC NO. 55507**

Roeske, Wolfgang

DEODORIZATION OF AIR. *(Vorrichtung zum Beseitigen gasfoermiger Luftverunreinigungen). Text in German. (Wallace and Tiernan--Chlorator GmbH, Wasserburg, West Germany) W. Ger. Pat. Appl. 2,144,787. 15p., Sept. 8, 1971. (5 claims).*

Air from a arcass utilization plant was deodorized by a gas washer with automatic control of the addition of oxidizing agent, e.g., chlorine, chlorine oxide, or ozone, by an analyzer for the oxidizing agents at the outlet. The analyzer allowed only a slight excess of the oxidizing agent in the purified air. In another device, excess, Cl2, ClO2, or O3 in air was removed automatically by a gas washer with an analyzer at the inlet, connected with a ventilator.

33161 **APTIC NO. 55522**

Wente, Heinrich

PURIFICATION AND DEODORIZATION OF INDUSTRIAL WASTE GASES. *(Verfahren und Nabwaescher zum Reinigen und Geruchfreimachen von industriellen Abgasen und -daempfen). Text in German. (Knecht Filterwerke GmbH, Stuttgart (West Germany)) W. Ger. Pat. Appl. 2,137,862. 8p., July 29, 1971. (4 claims).*

The purification and deodorization of industrial waste gases is described. The gases were treated in a wet scrubber with circulating liquid and exposed to ozonized air in an apparatus in which the end of the feed pipe for the ozone air mixture was combined with the end of the scrubbing liquid pipe near the spray wheel. The gases were then passed through a drop trap, connected with the vessel for the circulating scrubbing liquid, and a meandering reaction chamber.

33162 **APTIC NO. 55518**

Wingender, Benno

GRANULATE FOR AIR PURIFICATION. *(Masses zur Entgiftung bzw. Trocknung odor Desodorierung von Luft. Gasen odor Daempfen). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,129,795. 4p., June 16, 1971. (4 claims).*

The composition and application of porous granulates for air purification are described. The granulated mass is combined with volatile substances such as fuel oil or petroleum, which, after drying and driving off, increase the porosity. The mass is pressed into shape, e.g., slates. The granulates contain wood pulp, silica, sol, and optionally clay, gypsum, disinfectants, deodorants, and/or perfume.

1970

33163 **APTIC NO. 55556**

Kvitko, M. P.

FORMATION OF DUST IN OXYGEN-BLOWN-CONVERTERS WHEN THE LANCING RATE IS INCREASED AND THE JET OF OXYGEN DECONCENTRATED. *Stal, no. 11:860-862, 1970. 5 refs.*

To reduce the amount of dust formed (and iron lost with the dust) during steelmaking when the metal and oxygen are blown through a multinozzle lance, the diameter (d) of the nozzles must be less than D/n, where D is the diameter of a single nozzle lance of the same cross sectional area and n is the number of nozzles in the multinozzle lance. With the same nozzle diameter, the number n of nozzles can only be increased to a particular number, since reduction in the transverse cross-section involves the necessity for increasing the pressure of the oxygen reaching the lances in the piping. The external diameter should be increased only in cases where this does not increase the surface of contact between the jet of oxygen and the metal (proportional to nd). (Author abstract)

33164 **APTIC NO. 55555**

Mehta, N. C., T. S. Prasada Rao, S. K. Singh, N. Bhattacharyya, and S. P. Sen

A CATALYTIC PROCESS FOR THE REMOVAL OF ORGANIC SULPHUR COMPOUNDS FROM GAS STREAM. *Technol. (Sindri), 7(4):239-245, Dec. 1970. 19 refs.*

An alkalized iron hydrodesulfurization catalyst consisting of precipitated iron oxide and 15-20% alkali as carbonate has been developed as a substitute of the the cobalt-molybdenum catalyst COMOX for removal by hydrogenation of organic sulfur compounds and hydrogen sulfide in semi water gas. The influence of temperature and space velocity has been investigated to determine the optimum conditions for hydrogenation, and a system comprising alkalized iron and zinc oxide has been studied for the removal of sulfur components from semi water gas. Alkalized iron showed a maximum activity with respect to organic sulfur conversion at 400 C, and space velocity activity was independent of time of contact up to values of 10,000. The combined system of alkalized iron and zinc oxide was effective for sulfur removal for a fairly long period; efficiency dropped to 47% after 4500 hr. A brief presentation is given of the basic chemistry of hydrogenation and the process of activation of alkalized iron. (Author abstract modified)

33165 **APTIC NO. 56999**

Varshavskiy, I. L., B. F. Koney, V. B. Klyatskin, and Nami Lane

COMPARISON OF THE TOXIC EMISSIONS FROM ZIL-130 ENGINES WITH SPARK AND FLAME IGNITION. *(Sraveniye toksicheskikh vybrosov dvigateley ZIL-130 s iskrovym i fakel nym zazhiganiyem). Avtomob. Prom., no. 4:3-4, 1970. 5 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 8p.*

Carbon monoxide, oxides of nitrogen, aldehydes, hydrocarbons plus individual olefins), and benzypyrene were determined in a comparison of the toxic emissions from automobile engines using flame ignition versus spark-type ignition. Carbon monoxide emissions for the pre-combustion flame-type ignition engine were found to be lower than those from the spark type engine by a factor of 10, while NO emissions for the flame type were somewhat higher over the 83-100% interval of maximum engine power. Recirculation of 10% by weight of the exhaust gases, however, reduced the flame engine s NO emissions by a factor of 5 without significant increase in the CO emissions and with an increase in fuel consumption of no more than 1.5%. The flame engine also exhibited rapid growth in the emission of hydrocarbons and aldehyde (formaldehyde being predominant) when the fuel mixture was leaner than the limit of effective leaning. Benzypyrene was found in the flame ignition engine only when the engine was running at maximum, and limiting the power of the precombustion chamber engine by a few percentage points was sufficient to eliminate the carcinogen from the exhaust. The spark ignition engine exhibited benzypyrene over its entire load range.

1969

33166 **APTIC NO. 55567**

A 30-TON CAPACITY STEEL SMELTING ELECTRIC-ARC FURNACE. *(D un four a arc d acierie de 30 t). Text in French. J. Four Elec., no. 10:259-261, Dec. 1969.*

The dust separation equipment of a 30-ton-capacity steel smelting electric-arc furnace in Belgium is described. The gaseous emission contain very fine iron oxide dust whose specific emission amounts to 5-15 kg/ton of steel processed. Complete capture of the furnace gas is secured by means of pipelines which also provide for cooling the waste gases from 1700 to 130-135 C. The cooled gas is then passed through Amertherm bag filters of fluoride resistant polyester tissue. The total filter surface amounts to 550 sq m. The bag filter incorporates 84 bags. The dust separation equipment operates automatcally, and the purified gas leaving the bag filter is colorless.

1967

33167 **APTIC NO. 56998**

Kerimov, N. A. and R. I. Mekhitiyev

A FUEL INJECTION ENGINE WITH PRECOMBUSTION CHAMBER IGNITION. *(Dbigatel s vpryskom topliva i forkamerno-fakel nym zazhiganiyem). Avtomob. Prom., no. 1:8-11, 1967. 2 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 13p.*

The design, operation, and test results are presented for a fuel injection engine with precombustion chamber ignition. Combustion in an engine running with two injectors working in parallel occurs with great stability, even down to deep total leaning of the mixture. Control tests of a one-cylinder engine using the new fuel delivery and ignition system indicate a reduction in the optimum ignition advance angle at all speeds and loads as compared to carburetion and spark ignition. This reduction is a result of the reduction in the total time of combustion for the working mixture in the cylinder. The use of fuel injection increases engine power by 15-20% as compared to carburetion. The proposed method for achieving fuel atomization and ignition will, in principle, provide quality control of power over the entire engine operating range. Further testing of the method is planned for the M-21 engine used in the Volga passenger car.

33168 **APTIC NO. 55499**

Ludington, D. C., D. E. Bloodgood, and A. C. Dale

STORAGE OF POULTRY MANURE WITH MINIMUM ODOR. *Preprint, American Society of Agricultural Engineers, St. Joseph, Mo., 19p., 1967. 3 refs. (Presented at the American Society of Agricultural Engineers, Annual Meeting, 61st, Detroit, Mich., Dec. 12-15, 1967, Paper 67-932.)*

A method of storage of poultry manure with minimum odor is described. Offensive odors (hydrogen sulfide) occur in anaerobic conditions which can be described in terms of an oxidation reduction potential (ORP). The ORP of storage poultry manure was controlled by controlling the rate of aeration and by measuring the production of H2S. An ORP control system was developed to permit the ORP of four chambers to be operated at four different levels of ORP simultaneously. An average of 12.8 cu ft of air/day, chicken was required to maintain an ORP of -400 mv and to create a situation where no H2S was produced. Chicken manure stored at -400 ORP had a 35.9% reduction in volatile solids. Chicken manure stored at zero ORP also produced no odor but had a higher reduction of volatile solids. Analysis of all the chamber contents was the only procedure for obtaining a meaningful measure of degradation. Accurate measurement of low concentrations of dissolved oxygen in fluid chicken manure was impossible. (Author conclusions modified)

1958

33169 **APTIC NO. 57060**

Nilov, N. A.

PECULIARITIES OF CARBURETOR ENGINES WITH FLAME IGNITION. *(Osobennosti Karbyuratornykh dvigateley s fakel nym zazhiganiyem). Avtomob. Prom., no. 8:25-26, 1958. Translated from Russian, 9p. Translation Consultants, Ltd., Arlington, Va., (incomplete article.)*

The design and operation of a precombustion chamber-flame ignition system for carburetor automobile engines is presented. The system is based on ignition of the working fuel mixture in the combusiton chamber by a powerful flame of hot combustion products emitted through nozzle openings from a supplemental chamber (precombustion chamber-premix chamber) where ignition of a specially delivered fuel mixture is by a conventional spark plug. Ignition of a considerably leaner fuel mixture occurs even when the engine is throttled because of the great quantity of heat liberated by the flame, and combustion occurs much more rapidly. Detonation is partially suppressed so that compression ratio can be increased or gasoline with a lower octane number can be used. Tests comparing the new system to a conventional system on a special one-cylinder engine showed that the absolute value of maximum specific fuel consumption is markedly lower with the new system. Individual experiments showed that it is possible to reduce the fuel octane number requirements by five or six units. Two designs of automobile engines with pre-combustion chamber-flame ignition developed by the Institute of Chemical Physics of the Academy of Sciences of the USSR are illustrated and described in brief.

33170 **APTIC NO. 55502**

Stephan, David, G., Paul T. Bohnslav, Robert A. Herrick, George W. Walsh, and Andrew H. Rose, Jr.

A NEW TECHNIQUE FOR FABRIC FILTER EVALUATION. *Am. Ind. Hyg. Assoc. J., vol. 19:276-284, 1958. 5 refs. (Presented at the American Industrial Hygiene Association, Industrial Health Conference, Atlantic City, N. J., April 24, 1958.)*

Two new instruments have been developed for the purpose of implementing a new technique for fabric filter evaluation: the mass probe, which allows the determination of local filter cake masses; and the filter velocity probe, which allows the concurrent determination of filter velocities through specific areas of a filter. These instruments are adaptable for field or laboratory use with various types of air filtration equipment. The mass probe measures the mass of an object by the intensity of the beta radiation passing through that object. The probe is discussed in terms of isotope selection, source activity required, probe design, scaling, calibration, and its use and accuracy. The filter velocity probe is discussed in terms of its design, use, calibration, and accuracy.

MEASUREMENT METHODS

1973

33171 **APTIC NO. 55419**

INSTRUMENT FOR THE DETERMINATION OF THE OPACITY OF AUTOMOBILE ENGINE EXHAUST GASES. *(Pribor dlya opredeleniya stepeni dymnosti vykhlopnykh gazov avtomobil nykh dvigateley). Text in Russian. Byul. Tekh.-ekon. Inf., no. 8:34, 1973.*

An instrument for the evaluation of the state of repair of vehicle engines by measuring the exhaust gas opacity is described. The exhaust gases are led from the silencer into an optic measuring chamber with photoresistor through a venturi tube. The light absorption by the exhaust gas, a function of smoke density, is measured photoelectrically.

33172 **APTIC NO. 55586**

Japan Environmental Agency, Air Quality Bureau

AIR POLLUTION BY PHOTOCHEMICAL REACTIONS -- PRACTICAL GUIDE FOR THE EXAMINATION OF AIR (TOKYO BAY AREA). *(Kokagaku hanno ni yoru taiki osen -- taiki chosa (Tokyo-wan chiiki) jisshi yoryo). Text in Japanese. 20p., July 1973.*

Air pollution over Tokyo Bay will be measured. Wind direction and velocity, oxidants, ozone, nitrogen oxides, total hydrocarbons, methane, carbon monoxide, and air temperature will be measured. Pollution concentrations will be measured at 0, 100, 200, and 300 m from the ground. Temperatures will be measured at 0-1500 m with a radiosonde and winds will be measured with a pilot balloon. Concentrations of O3, nitrogen dioxide, and aerosols will be measured by an airplane. A tracer will be used to determine diffusion in the area.

33173 **APTIC NO. 55588**

Japan Environmental Agency, Air Quality Bureau

AIR POLLUTION BY PHOTOCHEMICAL REACTIONS -- PRACTICAL GUIDE FOR THE EXAMINATION OF AIR (OSAKA BAY AREA). *(Kokagaku hanno ni yoru taiki osen -- taiki chosa (Osaka-wan chiiki) jisshi yoryo). Text in Japanese. 14p., July 1973.*

Nitrogen oxides, total hydrocarbons, methane, and carbon monoxide will be measured at 0-300 m using a tetroon and at 100-1000 m using an airplane over Osaka Bay. Nitric oxide, nitrogen dioxide, and sulfur trioxide will be measured with a pilot balloon. Wind direction and velocity an air temperature will be measured.

33174 **APTIC NO. 55659**

Amaya, Kazuo

MEASURING AND SUPERVISION TECHNIQUES OF NITROGEN OXIDES -- PRESENT STATE AND FUTURE PERSPECTIVES. *(Chisso sankabutsu no sokutei, kanshi gijutsu -- genjo to shorai e no tenbo). Text in Japanese. Gijutsu to Kogai (Tech. Pollut.), 3(4):503-508, Sept. 1973.*

Nitrogen oxide measurement methods are described, and problems are mentioned. The alkali filter paper method gives results agreeing with ordinary methods with a 30% error. This accuracy is sufficient because the fractionation of data due to the measuring place is larger than this error. Monitoring stations and control methods are mentioned.

33175 **APTIC NO. 55729**

Ando, Eiichi and Michiho Tanabe

AN APPLICATION OF ELECTRODEPOSIT METHODS TO X-RAY FLUORESCENCE ANALYSIS. *(Denchaku noshukuho no keiko X-sen bunseki e no oyo). Text in Japanese. Shimazu Hyoron (Shimazu Rev.), 30(1):63-67, March 1973. 9 refs.*

For accurate measurement of low concentrations of pollutants (0.1-0.01 ppm), an application of the electrodeposit method to x-ray fluorescent spectrometry was tested. The effects of interference of foreign elements, the pH level and the temperature of the test material solvent were examined. The principles of x-ray fluorescence analysis, the quantitation analysis of trace concentration, and electrodeposit analysis apparatus are discussed. The interference of electrodeposited elements must be determined by the calibration curve of the desired element. The potentials are different depending on the chemical bond of elements, and the interference of unknown material must not be judged by the reduction potential and the strength of x-ray fluorescence. The level of pH must be adjusted from 5 to 8 by oxidation or reduction. The limit of measurements in a regular electrodeposition tank are determined by the internal resistance of the material solution and the maximum output electric pressure of the source. The minimum detection limit at the minimum current of 3mA, maximum time of one hour, is several ppb. The temperature of the test solution for an accurate quantitation should be 15-35 C.

33176 **APTIC NO. 55577**

Birks, L. S. and J. V. Gilfrich

DEVELOPMENT OF X-RAY FLUORESCENCE SPECTROSCOPY IN ELEMENTAL ANALYSIS OF PARTICULATE MATTER PHASE II: EVALUATION OF COMMERCIAL MULTIPLE CRYSTAL SPECTROMETER INSTRUMENTS. *Naval Research Lab., Washington, D. C., NRL Problem P04-06, Environmental Protection Agency Interagency Agreement 690114, Program Element 1A1010, NRL Report 7617, EPA-650/12-73-006, 14p., June 15, 1973. 2 refs.*

NTIS: PB AD-762061

Four commercial multiple crystal spectrometer x-ray analyzers were evaluated for use in the elemental analysis of air pollution particulate samples. The instruments are capable of measuring 14 to 24 elements simultaneously. One hundred second detection limits of 1 to 10 ng/sq cm were achieved for about one-half of the elements examined, and any one of the commercial instruments is capable of performing quantitative analysis of the particulate matter filtered out of the atmosphere or from source emissions. Some actual pollution samples were analyzed to demonstrate suitability. (Author abstract modified)

33177 **APTIC NO. 55744**

Borkowska, Maria and Halina Wyszynska

COLORIMETRIC METHOD OF THE DETERMINATION OF NITROGEN DIOXIDE IN ATMOSPHERIC AIR. *(Kolorymetryczna metoda oznaczania dwutlenku azotu w powietrzu atmosferycznym). Text in Polish. Roczniki Panstwowego Zakladu Higi., 24(3):291-295, 1973. 11 refs.*

The necessity for determining the content of nitrogen dioxide in the atmospheric air is emphasized, and methods of determination are evaluated. Nitrogen dioxide is the most hazardous pollutant when compared to other nitrogen oxides, due to its high toxicity and active part in photochemical reactions. Various measurement methods were checked and compared with Saltzman s method. Routine procedures of nitrogen dioxide determination are described. After sampling the atmospheric air in gas purifiers, the latter have to be filled with distilled water to initial capacity. The contents have to be transferred to colorimetric samplers, and 3 ml of N 1 naphthene ethyl diamine chlor hydrochloric acid solution. The contents are mixed. After 5 min the absorption value is read on the photocolorimeter for a lambda equals 550 nm wavelength. When a proper air sampling is made, the solution in the gas purifier should not change color. Should any color appear in the solution in the second gas purifier, the NO2 concentration in it must be determined and considered when calculating the final result. The method gives a detectability of 0.1 micrograms/5 ml sample.

33178 **APTIC NO. 55378**

Brocco, D., A. Cimmino, and M. Possanzini

DETERMINATION OF AZA-HETEROCYCLIC COMPOUNDS IN ATMOSPHERIC DUST BY A COMBINATION OF THIN-LAYER AND GAS CHROMATOGRAPHY. *J. Chromatog., 84(2):371-377, 1973. 6 refs.*

A simplified and relatively rapid method, based on a gas chromatographic determination preceded by a thin layer chromatography, for the separation of heterocyclic nitrogen compounds in atmospheric particulate matter was developed. The benzene extract of the dust is applied to a silanized silica gel plate and developed with benzene-hexane-pyridine (4:5:1). In this way, aza-heterocyclic compounds are separated from other classes of components, such as polynuclear hydrocarbons and paraffins. The portion containing aza-heterocyclic compounds is extracted again and examined by gas chromatography on a high efficiency glass capillary column coated with Versamid 900. (Author abstract)

33179 **APTIC NO. 55691**

Buerkholz, Armin

CALIBRATION STUDIES ON A CASCADE IMPACTOR. *(Eichuntersuchungen an einem Kaskadenimpaktor). Text in German. Staub, Reinhaltung Luft, 33(10):397-401, Oct. 1973. 15 refs.*

On four different types of cascade impactors, micrometric measurements and pressure loss measurements were carried out. The impactors consist of standardized exchangeable elements shaped as funnels. In the top of the funnel an exchangeable circular nozzle can be inserted. In the bottom of the funnel the impaction plate is mounted in an accurately defined distance from the nozzle. The elements differed only by the nozzles whose diameter can be from 0.85 to 13 mm. Such measurements permit the selection of favorable element combinations from parallel measurements. For two impactors, the aerosol losses, i.e., the quantity of aerosols not impacting on the plate but on the wall, were determined and listed in a table. As the first calibration method, the passage of an oil aerosol through the cascade impactor under defined conditions and the following determination of the number and size distribution of the droplets collected on the impaction plates is described. This method was too inaccurate, as a comparison with calculated values shows. The accuracy could be improved by connection of two equal elements in tandem. The results obtained by this method agreed satisfactorily with the results of the theoretical calculations.

33180 **APTIC NO. 55441**

Byers, R. L.

TEST FOR GAS STREAM PARTICULATES. *Hydrocarbon Process., 52(10):92-94, Oct. 1973. 5 refs.*

Available technology for the sampling and analysis of particulates in gas emissions are compared. Samples taken from a process flue gas using membrane filters, glass fiber filters, wet impingers, and an Andersen in-stack sampler were analyzed for size distribution by light and scanning electron microscopy, the Ranz and Wong equation, and manufacturer s calibration curves. Most accurate results were obtained using membrane filters and microscopic particle size analysis for gases at temperatures of 300 F or below, and using an Andersen in-stack sampler with coated plates for gases above 300 F. Particles can be collected in virtually unagglomerated form on membrane filters, while the Andersen sampler, as a result of reentrainment, tends to give a finer size distribution than actually exists when used with standard collection plates. Coating the plates with a 1% solution of silicon grease in benzene produces results comparable to those obtained by microscopy. When the effluent gas is below 300 F, samples can be obtained on membrane filters, and particle size analysis can be done microscopically. At temperatures above 300 F, reasonable results can be obtained with the Andersen in-stack sampler using plates coated with adhesive film. Additional data are needed to establish a definite relationship between Andersen and microscopic analysis.

33181 **APTIC NO. 55345**

Cooper, Hal B. H., Jr.

CAN YOU MEASURE ODOR? Hydrocarbon Process., 52(10):97-101, Oct. 1973. 29 refs. (Presented at the Air Pollution Control Conference, Knoxville, Tenn., March 29, 1973.)

The determination of odor levels in ambient air is summarized. Methods for direct evaluation of odors provide a means for evaluating their potential impact in terms of intensity, threshold, and objectionability. Progressive syringe dilutions using a panel of trained observers in a remote laboratory location provides one useful method for determining odor levels in ambient air and source gas streams. Dynamic dilution systems and the Scentometer may also prove useful for odor evaluation under some conditions. Chemical methods are of limited usefulness in making direct odor measurements, particularly in ambient air. There are a number of problems involved in making determinations of odor levels in ambient air or flue gas streams. Physical problems include losses of materials by adsorption on container and tubing walls, losses by condensation in the presence of water, and reaction of odorous gases during storage or transport. Problems in organoleptic response of observers include meterological variations in humidity, temperature, wind speed, and direction. Also affecting olfactory response of observers include physical condition, smoking, prior history of exposure, and olfactory fatigue after prolonged exposure to odorous constituents.

33182 **APTIC NO. 55687**

Cunnold, D. M., C. R. Gray, and D. C. Merritt

AEROSOLS: A LIMITATION ON THE DETERMINATION OF OZONE FROM BUV OBSERVATIONS. *Pure Appl. Geophys. (Basel), vol. 106-108:1264- 1271, 1973. 13 refs.*

Recent satellite experiments have measured the radiance of the earth at ultraviolet wavelengths, and the data thus obtained has been used to determine atmospheric ozone concentrations. In the presence of significant concentrations of aerosols at high altitudes, it is not possible from observations of backscattered ultraviolet radiation to separate the effects of aerosols from those attributable to ozone. The earth s daytime horizon was scanned on several occasions between 1963 and 1967 from an altitude of 80 km. For at least one of the flights analyzed, the data indicated the existence of an aerosol layer at 50 km. This observation, in combination with related observations of other experiments, implies a limitation on the ability of the backscattered ultraviolet technique to determine ozone concentrations, particularly at altitudes between 35 and 50 km. This limitation may be overcome by altering the viewing geometry and making observations of the earth s horizon. Data thus obtained may be used to deduce the concentrations of both ozone and aerosols. (Author summary)

33183 **APTIC NO. 55347**

Das, H. A., J. E. Evendijk, and J. P. M. deJong

THE DETERMINATION OF NICKEL IN AIR DUST BY NEUTRON ACTIVATION ANALYSIS. *J. Radioanal. Chem., 13(2):413-418, Feb. 1973. 8 refs.*

A method for the determination of nickel in small samples of air dust, collected on filter paper, by thermal neutron activation and chemical isolation is described. The separation of Ni from the nitric acid solution was achieved by liquid liquid extraction with chloroform as the dimethylglyoxime complex from a slightly alkaline 50% ammonium citrate or ammonium tartrate solution. The sample was counted for 2 hr in the well of a 3 sq in. sodium iodide (tantalum) crystal. The gamma-ray spectrum was read out and the area under the 0.37 MeV photopeak of 65Ni was determined. The absolute sensitivity of the method was about 0.02 microgram Ni. The relative sensitivity was 0.005 micrograms Ni/cu m in an air sample of about 1000 cu m. (Author abstract modified)

33184 **APTIC NO. 55373**

Fawcett, P., D. Green, and G. Shaw

THE APPLICATION OF NEUTRON ACTIVATION ANALYSIS TO THE DETERMINATION OF TRACE ELEMENTS IN POLLEN AND SPOROPOLLENINS. *J. Radioanal. Chem., 13(2):313-318, Feb. 1973. 15 refs.*

The application of neutron activation analysis to assay the trace elements, cobalt, iron, scandium, rubidium, and zinc in pollen and derived sporopollenins was investigated. The method is capable of high precision and avoids the necessity for sample ashing and the introduction of reagent contamination. Rubidium was completely removed during the chemical isolation of sporopollenins, and the remaining elements which survived chemical treatment were found in reduced amounts. The ratio of Sc:Fe in pollen and in several derived sporopollenins was approximately constant. Results are discussed with reference to the possibilities of anomalous chemical behavior of the elements resulting from irradiation. (Author abstract modified)

33185 **APTIC NO. 55367**

Habel, Karl

PRESENT STATE OF THE MEASURING TECHNIQUE FOR THE DETERMINATION OF THE FLUORINE CONTENT IN IMMISSIONS AND EMISSIONS. *(Derzeitiger Stand der Mebtechnik zur Bestimmung des Fluorgehaltes in Immissionen und Emissionen). Text in German. Arch. Eisenhuttenw., 44(9):697-702, Sept. 1973. 7 refs.*

The difficulties encountered in the separation of gaseous and solid fluorine compounds are described. If precise data can be given on the concentrations, reasonable predictions will only be possible. The same criteria must be valid for emission ground level emission (immission) measurements because of their close relationship. Methods which yield optimum measurement results corresponding to the actual state of engineering should be examined. The experimental investigations revealed that a reliable procedure for the exact separation of gaseous and solid fluorine compounds is not yet available. A solution would be possible, if binding definitions for the limitation between gaseous and solid fluorine compounds are given and accepted. A procedure could be suggested for emission measurements enabling the determination of gaseous fluorine compounds with an exactness of 10 to 15%. The solid fluorine compounds can be determined on the basis of an exact determination of dust. (Author summary modified)

33186 **APTIC NO. 55709**

Hemon, Gilbert, Raymond Pannetier, and Jean Claude Philippot

THE PREPARATION OF SAMPLES OF ATMOSPHERIC AEROSOLS WITH REGARD TO THEIR EVALUATION AND TO THE SYSTEMATIC MONITORING OF RADIOACTIVITY. *(Aufbereitung von Messproben atmosphaerischer Aerosole im Hinblick auf ihre Auswertung und auf die systematische Ueberwachung der Radioaktivitaet). Text in German. Staub, Reinhaltung Luft, 33(10):401-405, Oct. 1973.*

Some methods of treating aerosols from the atmosphere for systematic measurement of radioactivity are presented. Microsorban filter media condisting of polystyrene was used to sample the aerosols. This media can be used for measuring any kind of radiation. The sample can be adapted to the electronic measuring equipment used and to the automation of radiation measurement. The fiber diameter is between 0.6 and 0.8 micron. The area weight is 15 mg/sq cm. The collection efficiency may be as high as 99.99% for particles of a size of 0.3 micron and an entrance velocity of several cm/sec. The maximum specific volume flow is 0.22 cu m/hr/sq cm at a pressure difference of 300 N/sq m. This maximum volume flow corresponds to an entrance velocity of 5.8 cm/sec.

33187 **APTIC NO. 55775**

Takano, Hironobu

POLLUTION MEASURING DEVICES. *(Kogai Keisokuki). Text in Japanese. Toshiba Rebyu (Thoshiba Rev.), 28(7):733-739, July 1973. 3 refs.*

Various pollution measuring devices are described: for nitrogen oxides, chemiluminescence; for carbon monoxide, methane, and total hydrocarbons, gas chromatography; for automotive exhausts non-dispersion infrared analyzer and polarograph; for photochemical smog experiments, smog chambers; and for pollution movements and meteorological effects, lidar are described. The sulfur content in fuel is measured by the combustion tube method or the RI (?) method, and the accuracy of concentration of standard gas and its reliability are discussed. Smog chambers can be the mobile or fixed type. The mobile type consists of two large buses, one of which takes sampling of the air and irradiates it with ultraviolet ray; the other bus contains various gas analyzers. The advantage of this type is its capability to sample polluted air on site and to experiment with it immediately. The other has the same equipment that are fixed in the lab. The sources for ultraviolet are a fluorescent chemical lamp with the maximum luminescence of approximately 365 nm and a fluorescent lamp with the maximum energy of 310 nm. These are installed on a pure aluminum reflector; the power can be adjusted. The sample air is irradiated through pyrex glass or teflon membrane. The ultraviolet ray intensity meter is an instrument specially developed for use in a smog chamber.

33188 **APTIC NO. 55385**

Hollowell, Craig D., Glenn Y. Gee, and Ralph D. McLaughlin

CURRENT INSTRUMENTATION FOR CONTINUOUS MONITORING FOR SO2. *Anal. Chem., 45(1):63A-66A, 69A-72A, Jan. 1973.*

Electrochemical, spectrometric, colorimetric, and chromatographic techniques for monitoring sulfur dioxide are reviewed, and features of commercially available SO2 analyzers are summarized. The instruments are primarily divided into ambient air monitors and stationary source monitors and are specified according to principle of operation, manufacturer, model, measuring range, response time, cost, and multiparameter capability. Most of the units are capable of monitoring gases other than SO2. Additional equipment is usually necessary for multiparameter capability.

33189 **APTIC NO. 55701**

Ishidawa, Noboru, Masao Kusakabe, and Masao Isozaki

A NEW NITROGEN DIOXIDE DETECTOR I. DETECTION OF NITROGEN DIOXIDE BY CELLULOSE ACETATE FILMS MIXED WITH IODIDES. *(Nisanka chissho no kani kenchiho (daiippo)--Yokabutsu-sakusan seniso himaku ni yoru kenchi-ho)). Text in Japanese. Tokyo Kogyo Shikensho Hokoku, 68(7):322-326, July 1973. 2 refs.*

A new method for the detection of nitrogen dioxide is presented. A transparent and ductive cellulose acetate base film mixed with iodide is prepared; it is flat and even, with a thickness of 0.15 mm. Its ductility depends on the quantity of iodide in the mixture. The NO2 reacts with the iodide in the film, liberating iodine; the concentration of the iodine is colorimetrically determined. Film exposed to NO2 had a maximum absorption between 290 and 360 micron. A calibration curve is obtained based on the differences in the optical densities of the film before and after exposure to known quantities of gases. The optical density of the film increased linearly with the NO2 concentration. Potassium iodide, zinc iodide, and cadmium iodide were examined, with zinc iodide being the most sensitive. The film was stable before exposure and had a high resistance to heat.

33190 **APTIC NO. 55395**

Jones, K., J. Lee, and A. M. Montgomery

THE CONTROL OF CARBON MONOXIDE MONITORING SYSTEMS IN MINING. *Mining Eng. (London), no. 156:29-39, Oct. 1973. 5 refs. (Presented at the IEE-IME Colloquium on Measurement and Control in Coal Mining, London, England, May 23, 1972, Paper 4490.)*

Two techniques for the continuous monitoring of carbon monoxide in British coal mines are described. In the first system, air from a number of points underground is drawn by pumps through a tube bundle to the surface where it is presented sequentially to surface analyzers and a recorder display indicating the levels of CO occurring at each sampling point. Variations in design permit flexibility of the number of points sampled and the frequency of sampling, the types of gases analyzed, and the presentation of results obtained. The major details of 12 installations are given and include three basic methods to present the CO concentration: continuous trace, point sequence, and bargraph. In the second approach, a surface control system routes in turn gas from four points to an underground analyzer, the resulting analogue signal is transmitted to the surface by a pulse modulation technique and displayed on a four point recorder. The two techniques are described in detail, with emphasis on the control systems employed, and their relative merits are briefly indicated.

33191 **APTIC NO. 55712**

Jost, Dieter and Rainer Schmidt

AN AIRPLANE ADAPTED MEASUREMENT SYSTEM FOR MONITORING AIR POLLUTANTS. *(Ein Flugzeug adaptiertes Messsystem zur Ueberwachung der Luftverunreinigung). Text in German. Staub, Reinhaltung Luft, 33(10):405-406, Oct. 1973. 12 refs.*

In the years 1971 and 1972 a measurement set-up of airplane-adapted instruments was put together. Through the combination of discontinuous and continuous measurement instruments, measurements in heavily polluted air and in clean air up to an altitude of 5000 m are feasible. The following pollutants are measured discontinuously: sulfur dioxide, ammonia, nitric oxide, sulfate, nitrogen dioxide, ammonium, and 12 metals. Continuous measurements are taken of SO2, NO, NO2, ozone, carbon dioxide, aitken nuclei, and large and extra large nuclei. The pressure, relative airplane velocity, temperature, and relative humidity are the meteorological parameters which are continuously measured. The various measurement methods employed are listed in a table. New and to date unpublished methods have been developed for the continuous measurements of SO2, O3, and CO2.

33192 **APTIC NO. 55614**

Kanagawa, Akira

THE EFFECT OF LIGHT ABSORPTION RATE ON GRAIN SIZE DETERMINATION BY A LIGHT SCATTERING METHOD. *(Hikari sanranho ni yoru ryukei sokutei ni okeru hikari kyushuritsu no eikyo). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 293-294, 1973. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

A method for measuring particles by light scattering with a photometer or photocounter is discussed. The refractive index has a large effect on the measurements. The method can be used to measure particle size. The effect of refractive index is great when the value of the refractive index is small, but as the value increases, the effect decreases. When the value equals 1.0, the scattering function does not depend on the scattering angle and the refractive index.

33193 **APTIC NO. 55618**

Kitamoto, Asashi and Yoichi Takashima

THE TURBULENT DIFFUSION MODEL OF AEROSOL PARTICLES AND THE EFFECT OF GRAVITY. *(Ryukei bunpu o motsu earozoru ryushi no ranryu kakusan moderu to juryoku no eikyo). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 297-298, 1973. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

During monitoring and sampling of aerosols the amount of particles adhering to the tube wall between measuring point and detector causes measuring errors, so it is necessary to evaluate the amount of adhered particles. The effect of gravity cannot be ignored even when the air stream is in a turbulent state. Several diffusion equations were used to study gravity sedimentation, change in velocity of particles during the period of turbulent velocity alteration, diffusion of particles in the boundary layer near a wall, and particle adherence. Fine particles in a turbulent flow are transferred by the interaction of gravity and inertia due to velocity alteration. The diffusion models are compared.

33194 **APTIC NO. 55740**

Koshimizu, Toshiko; Kazuyuki Takamatsu, Yutaro Sekiguchi, Shigeru Hashimoto, Mikihiro Kaneko, Yoshio Saiki, Shozo Fukui, and Saburo Kanno

STUDIES ON THE PRACTICAL APPLICATION OF AN ION ELECTRODE METHOD (3)--SURVEYS ON DETERMINATION METHOD OF CYANIDE IN AUTOMOBILE EXHAUST GAS. *(Ion denkyokuho no jitsuyoka ni kansuru kenkyu (daisanpo)--Jidosha haishutsu gasuchu no shian no bunsekiho no kento). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 12(4):250-253, Aug. 1973. 1 ref.*

The ion electrode method was compared with the conventional pyridine-pyrazolone method in the determination of cyanide in automobile exhaust. The former simplified the procedure and offered a better recovery ratio. With the ion electrode method, the potential of the absorbed test solution is determined at pH 12.7 to 13.0 and no interference is offered by the presence of carbon dioxide. On the other hand, with the pyridine-pyrazolone method, the absorbed test solution should be colored following its neutralization; this resulted in the escape of hydrogen cyanide followed by the generation of CO2. The determination procedure is outlined.

33195 **APTIC NO. 55636**

Kraus, Franz-J.

THE INFLUENCE OF FORWARD SCATTERING ON MEASUREMENTS OF THE DEGREE OF TRANSMISSION OF AEROSOLS. *(Der Einfluss der Vorwaertsstreuung auf Transmissionsgradmessungen an Aerosolen). Text in German. Staub, Reinhaltung Luft, 33(9):348-352, Sept. 1973. 12 refs.*

Aerosol transmission can be measured accurately only by means of an emitter-receiver arrangement in which no forward- scattered light falls onto the receiver. In practice, this is only possible by approximation. To express the effect of forward scattering, a correction factor has been defined and calculated accurately for different emitter-receiver arrangements, as a function of the aerosol particle size and the measuring light wavelength according to the Mie theory. To illustrate the importance of the correction factor, an error has been defined for the measurement of the transmission degree and of the extinction modulus; this error has been calculated as a function of the correction factor. Results are shown graphically.

33196 **APTIC NO. 55768**

Kuroda, Daisuke

DETERMINATION OF NITROGEN OXIDES WITH A NITRATE ION SELECTIVE ELECTRODE. *(Shosan ion sentakusei denkyoky ni yoru chisso sankabutsu no teiryo). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 22(9):1191-1196, Sept. 1973. 16 refs.*

As an alternative to the commonly employed phenoldisulfonic acid (PDS) method, a nitrate ion-selective electrode was used to determine the nitrogen oxide concentrations in a variety of effluents. The sample gas was introduced into a flask containing the absorbent, after which oxygen was added and the mixture allowed to stand. The contents of the flask were then stirred with a magnetic instrument and the NO3 ion electrode and a reference electrode were immersed in the solution. The potential was measured after 1 min with an expanded-scale voltammeter. The NO3 concentration of the sample was obtained from a calibration curve which was prepared by plotting the millivolt reading versus the NO3 concentrations of standard solutions. With this procedure, six to ten samples can be analyzed within 1 hr. The analytical results for standard nitric oxide obtained with this method were in good agreement with those obtained by the PDS method, and large amounts of sulfur dioxide and hydrogen chloride did not interfere with the results. Since the electrode method is rapid and convenient, it is applicable to the routine analysis of NOx in various effluents.

33197 **APTIC NO. 55606**

Linch, A. L., E. R. Hendrickson, M. Katz, R. J. Martin, G. O. Nelson, J. N. Pattison, A. L. Vander Kolk, R. B. Weidner, and J. N. Harman

NONDESTRUCTIVE NEUTRON ACTIVATION ANALYSIS OF AIR POLLUTION PARTICULATES. *Health Lab. Sci., 10(3):251-262, July 1973. 11 refs.*

The nondestructive neutron activation analysis of air pollution particulates can be used for the destructive or nondestructive analysis of aerosols. With this technique, a large number of isotopes can be counted simultaneously, and, if computer assisted, the technique can become almost completely automated. The method is described, along with the sampling procedure for the aerosols to be analyzed. Automated data reduction, the computer program, and the method s sensitivity and application are also discussed.

33198 **APTIC NO. 55440**

Merryman, Earl L., Chester W. Spicer, and Arthur Levy

EVALUATION OF ARSENITE-MODIFIED JACOBS-HOCHHEISER PROCEDURE. *Environ. Sci. Technol., 7(11):1056-1059, Nov. 1973. 9 refs.*

Modifications in the Jacobs-Hochheiser (J-H) method which is used to determine integrated nitrogen dioxide and nitric oxide levels (after oxidation of NO to NO2) in the 1-15 pphm range in indoor and outdoor environments are investigated. Under controlled experimental conditions, the absorption of small quantities of NO2 in a series of bubblers containing 0.10 or 0.25 N sodium hydroxide varied considerably resulting in poor reproducibility of data. The addition of up to 0.10% by weight of sodium arsenite to the absorbing solutions greatly improved the collection efficiency, the reproducibility, and the accuracy of the data. Nitric oxide interfered with the NO2 absorption process in the presence of arsenite; a correction factor was determined which can be used when the NO concentration is known. A carbon dioxide effect on the pH of the absorbing solutions was observed and taken into account in determining NO2 levels. Water vapor or methane had little or no effect on the NO2 collection and analysis process. The J-H procedure, modified with sodium arsenite and corrected for NO appears to yield accurate and reproducible integrated NO2 values. (Author abstract modified)

33199 **APTIC NO. 55320**

Murase, Akira, Motoji Terabe, Junichi Kobayashi, and Toru Iwasaki

A CALCULATING TECHNIQUE OF LIMITING SULFUR OXIDES EMISSION DENSITY. *(Kawasaki-shi ni okeru io sankabutsu chiku betsu kyoyo haishutsu soryo sanshutsu no shuho ni tsuite). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 290, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 41.)*

A method fo calculating the maximum allowable emission quantity of sulfur oxides for a given area (Kawasaki in this case) was introduced. The area is divided into 2 km right square grid, and the total emission quantity in each segment is calculated separately, according to each low or high stack sources. In this case, all high stacks were calculated as 100 m, and all low stacks 30 m. The Pasquill-Gifford diffusion formula was used. For low emission sources, an eight-direction wind frequency, was used, and for high emission sources, a 16-direction wind frequency, at 142 m was used. Then, each grid emission reduction rate was calculated from the effective pollution load of each segment. For high stack sources, the most stringent reduction rate of the low stack pollution load was applied. This theory is not immediately applicable to an administrative control program of a given area and requires revisions according to actual local conditions.

33200 **APTIC NO. 55671**

Ohring, George, Joseph Otterman, and Joachim Joseph

TECHNIQUES FOR AIR POLLUTION OBSERVATION FROM SPACE. *Water, Air, Soil Pollut., 2(2):191-217, 1973. 47 refs.*

The application of remote sensing from earth orbiting satellites to air pollution problems is discussed. Examples of these large scale problems are those associated with changes in the global background of gases and aerosols; potential stratospheric pollution resulting from SST operations; regional sources, pollution episodes, and large scale diffusion; and effects of pollutants on climate. These problems are discussed and observational requirements are specified. Possible remote sensing techniques for satellite monitoring include monitoring of pollutant gases and particulates by means of their absorption and scattering of radiation in both the solar spectrum range and terrestrial emission spectrum range. A discussion of potential difficulties includes the atmospheric and surface background problems, the temperature sensitivity problem in the terrestrial spectrum range, the band overlap problem, and the cloud interference problem. Recent observations from satellites and balloons are reviewed. It appears that except for water, and perhaps ozone, measurements of the vertical profiles of atmospheric pollutant gases and aerosols from satellites will be extremely difficult. Measurement of the total amounts in a vertical column of pollutant gases and aerosols does appear feasible. (Author abstract modified)

33201 **APTIC NO. 55707**

Oki, Katsuya, Takashi Akehata, and Takashi Shirai

PARTICLE-SIZE MEASUREMENT BY PHOTOMULTIPLIER. *(Kodenshi zobaikan ni yoru ryushikei no sokutei). Text in Japanese. Funtai Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan), 10(4): 195-203, May 1973. 6 refs.*

A convenient method for the measurement of particle size using a photomultiplier is presented. The measuring equipment consists of a source of parallel light beams and an optical fiber connected to a photomultiplier, which serves to detect the variation in light intensity. When one particle is passed through the detection section, the output of the photomultiplier changes according to the diameter of the particle. The relationship between the output of the photomultiplier and the particle diameter is numerically computed according to the theory of geometrical optics; the computations have been experimentally confirmed. The computer results, the measurement circuit, the detector calibration method, the estimation of errors due to the coexistence of particles in the slit, and measured examples of particle size are discussed. By applying this method, particle size distribution could be determined with a very small number of samples in a much shorter amount of time than afforded by any other method.

33202 **APTIC NO. 55451**

Ortman, Gordon C. and Vinson L. Thompson

PERFORMANCE OF HYDROCARBON MONITORING INSTRUMENTATION. *Preprint, American Society for Testing and Materials, Philadelphia, Pa., 23p., 1973. 21 refs. (Presented at the American Society for Testing and Materials Symposium, Instrumentation for Monitoring Air Quality, Boulder, Colo., Aug. 14-16, 1973.)*

A review is presented of hydrocarbon monitoring instrumentation. The total hydrocarbon analyzer, a nearly real time analyzer that generates a signal proportional to the ion current, is the most reliable instrument in air pollution monitoring networks. Non-methane hydrocarbon concentration can be obtained by operating a total hydrocarbon analyzer along side a carbon column methane detector and subtracting the difference. The subtractive column system, however, is temperature sensitive and demands the attention of a skilled operator capable of spotting irregularities in operation. Analysis of atmospheric hydrocarbons has been achieved by application of various gas chromatographic techniques, and approximately 200 hydrocarbons have been identified in this manner. Automated analyzers are available that are capable of performing as many as 12 analyses per hour. Three specialized systems for automatically monitoring the atmosphere for specific hydrocarbons are: the Gow-Mac system which uses a selective catalytic combustor to condition the sample stream before it enters a total hydrocarbon analyzer; the Bendix Ambient Hydrocarbon Analyzer which electronically subtracts the concentration of methane from that for total hydrocarbons; and the MSA system which is independent of programming, mechanical, and electromechanical functions and has a built-in supply of zero gas and purified combustion air.

33203 **APTIC NO. 55417**

Popov, V. A.

METROLOGIC PROBLEMS IN AIR POLLUTANT ANALYSIS. *(Metrologicheskiye zadachi v oblasti analiza atmosfernykh zagryazneniy). Text in Russian. Gigiena i Sanit., no. 2:80-83, 1973. 7 refs.*

Problems of the calibration of procedures and instruments for gaseous pollutant analysis by means of standard mixtures are discussed with respect to the determination of the reliability of analytical results. It is not acceptable to evaluate the error of specific analytical methods by the reproducibility of liquid standards, since the reactions of certain gases and vapors with absorbent liquids are non-stoichiometric and of multi-step character, and environmental factors interfere. The inadequacy of such an approach is most conspicuous in the indirect standardization of gas analytical procedures by means of gas imitators, such as sodium nitrite for nitrogen dioxide determination; potassium sulfate for sulfur dioxide; and sodium thiosulfate for the determination of hydrogen sulfide. Primary gas standards, whose composition is given by the very process of their preparation, are required for the assessment of the accuracy of analytical methods. Standard mixtures are currently obtained by diffusion, coulometric, and balloon techniques. Binary mixtures, or pollutant additives in polluted air samples can be equally used.

33204 **APTIC NO. 55462**

Porro, Thomas J., Robert E. Anacreon, Paul S. Flandreau, and Irving S. Fagerson

CORRECTED FLUORESCENCE SPECTRA OF POLYNUCLEAR MATERIALS AND THEIR PRINCIPAL APPLICATIONS. *J. Assoc. Offic. Anal. Chemists, 56(3): 607-620, 1973. 8 refs.*

Corrected fluorescence spectra were determined for 20 polynuclear aromatic compounds. The excitation spectrum was corrected by recording the ratio of the sample detector output signal to that of a reference detector which monitored the emission of a Rhodamine B quantum counter. A response curve flat to within plus or minus 5% was obtained. The corrected excitation data may be used in place of an absorbance spectrum when solution concentrations are below absorption thresholds. The corrected fluorescence excitation spectrum of a dilute solution of a pure compound having a single fluorescing group should be identical to its absorbance spectrum. The generation of such correction data should prove useful in comparing a large compilation of reference spectra for qualitative identification of an unknown and for quantitatively accurate comparisons of data from one instrument to another and with the same instrument over a period of time.

33205 **APTIC NO. 55437**

Robinson, James W. and James D. Dake

RELATION BETWEEN LASER INDUCED INFRARED FLUORESCENCE AND LASER ABSORPTION BY POLLUTANT GASES. *Spectrosc. Lett., 6(9):569-583, 1973. 13 refs.*

The absorptivities and fluorescence intensities of ethylene, sulfur dioxide, acetone, acetaldehyde, and formaldehyde were determined at a number of lasing wavelengths available with a carbon dioxide laser. Abrupt changes in absorptivity with small changes in laser wavelengths and corresponding variations in the fluorescence intensities were observed. These variations will be important in remote monitoring experiments which employ the CO2 laser, because they indicate that some analytical selectivity will be possible with small changes in excitation wavelengths. (Author summary modified)

33206 **APTIC NO. 55350**

Rosengren, Lars-Goran

ANALYSIS OF A LONG-DISTANCE SYSTEM MEASURING THE CONCENTRATION OF ATMOSPHERIC GASEOUS POLLUTANTS. *IEEE (Inst. Elec. Electron. Engrs.) Trans. Aerosp. Electron. Syst., AES-9(5):725-731, Sept. 1973. 5 refs.*

A detailed inaccuracy and sensitivity analysis of a long distance air pollution detection system, using a laser measuring the resonance absorption of polluting molecules, is introduced. The noise and the dynamic range of the radiation detectors used, the atmospheric inhomogeneities, and the atmospheric propagation losses of the electromagnetic radiation are considered. Before a fixed path length is chosen, the mean molecule density, scintillation, and propagation loss intervals for which the equipment will work must first be specified. Then a system with a low uniform inaccuracy in the whole measurement range can be built. It is often reasonable to let the extreme values of these parameters guide the choice of path length. (Author abstract modified)

33207 **APTIC NO. 55594**

Sakuta, Mamoru

HYDROCARBON MEASUREMENT IN AIR. *(Kankyo taikichu no tankasuiso no sokutei). Text in Japanese. Kankyo Sozo (Environ. Creation), 3(9):53-61, Sept. 1973. 8 refs.*

Total hydrocarbons can be measured by a flame ionization detector. This method cannot distinguish methane from nonmethane HC, so it is useless when measuring HC in relation to photochemical oxidant formation. Class analysis of HC can be done according to the reactivity of classes of HC. Nonmethane HC can be measured using a FID and gas chromatographic column, but the results are affected by the presence of oxygen. Gas chromatography is among the best available methods.

33208 **APTIC NO. 55340**

Sato, Toshio

GAS ANALYSIS USING SOLID PHASE ADSORPTION. *(Koso kyuchaku wo riyo suru gasu bunsekiho). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 22(5):632-641, May 1973. 20 refs.*

The adsorption of gases by zeolites, active alumina, silica gel, and active carbon is discussed. Adsorption mechanisms of oxygen, nitrogen, water, ammonia, sulfur dioxide, carbon dioxide, acetylene, and ethylene are reviewed. Adsorption gas chromatography is discussed. It can be used to analyze O2, N2, methane, CO, and CO2 and to separate hydrocarbons. A simple method of analysis combining adsorption and gas chromatography is described. Impurities are concentrated in a cooled concentrating column, then the column is warmed, and the concentrated impurities are developed by the sample gas itself. This method can so far only be used to helium and hydrogen.

33209 **APTIC NO. 55452**

Scaringelli, Frank P., John C. Puzak, Berne I. Bennett, and Robert L. Denny

DETERMINATION OF TOTAL MERCURY IN AIR BY CHARCOAL ADSORPTION AND ULTRAVIOLET SPECTROPHOTOMETRY. *Preprint, American Chemical Society, New York, 34p., 1973. 18 refs. (Presented at the American Chemical Society National Meeting, 165th, Dallas, Tex., April 8-13, 1973.)*

A simple and inexpensive method is described for the determination of concentrations of total mercury in the atmosphere. Mercury and its compounds are effectively collected by passing ambient air through activated charcoal contained in Vycor tubes. The charcoal tubes are prepared by heating under nitrogen to activate the charcoal and to remove impurities. The tubes are sealed with ball joints immediately after cleaning until ready for sample collection to prevent contamination. The tubes are resealed after sampling for transport to the laboratory where they become an integral part of the analytical gas train. The Mg and its compounds are vaporized by heating under a stream of N and carried to a thermal reactor which converts the compounds to the elemental state. Elemental Mg then amalgamates on silver allowing potential interferences to pass through the absorption cell. The Ag amalgam is heated to 300 C to give the absorption peaks in the ultraviolet at 253.7 nm that are sharp and reproducible. The method has been tested with simulated and real atmospheres under field conditions, and precision has been found to be greater than 95% within the range of 0.15 to 1.5 microgram/cu m. Although the error is greater outside of this range, the dynamic range may be shifted upward or downward by changing sampling rates, sample times, cell path, or a combination of these variables. (Author abstract modified)

33210 **APTIC NO. 55736**

Solomon, P.

CONTINUOUS STACK MONITORS INSTALLED. *Oil Gas J., 71(35):85-86, 88, 76, Aug. 27, 1973.*

Continuous stack monitors are described for four modified Claus sulfur-recovery plants of Gulf Oil Canada, Ltd. The monitoring system essentially requires: flow measurement for calculation of the weight of S emission; a temperature sensor to correct flow to standard conditions; a sample probe and S analyzer to obtain a measure of the S content of the stack gas, usually as sulfur dioxide; and on-line date processing to give the calculated S emission. The accepted method of measuring stack gas flow uses a pitot tube to sense differential pressure; this depends on the relationship that the square root of differential pressure is proportional to flow. Stack gas temperature is measured next to the flow sensor so that the calculated flow is temperature-compensated. The sampling probe must resist corrosion at temperatures close to the acid dew point of the stream. The analyzer and differential-pressure transmitter are located in an analyzer building at the base of the stack. The analyzer finally chosen is a process gas chromatograph which can operate above the dew point of the sample. On-line calculation is done by a pneumatic analog computer.

33211 **APTIC NO. 55723**

Sreedharan, C. R.

PROBLEMS EXPERIENCED IN CONTINUOUS RECORDING OF SURFACE OZONE BY THE ELECTROCHEMICAL METHOD AT POONA. *Pure Appl. Geophys. (Basel), vol. 106-108:1085-1090, 1973. 5 refs.*

The surface ozone recorder developed at Poona uses a Brewer electrochemical bubbler ozone sensor and provides a rapid and convenient method for the continuous measurement of the ozone concentration near the ground. Continuous recording with the sensor is possible if a constant level of solution can be maintained in the bubbler. This was achieved by incorporating a reservoir of potassium iodide solution which automatically syphons the solution into the bubbler. The errors enherent in the system and the successful attempts to rectify them and to obtain continuous and accurate records of surface ozone are discussed. The bubbler sensor can be used in ozonesondes to measure vertical distribution of ozone. (Author abstract modified)

33212 **APTIC NO. 55448**

Statnick, R. M., D. K. Oestreich, and R. Steiber

SAMPLING AND ANALYSIS OF MERCURY VAPOR IN INDUSTRIAL STREAMS CONTAINING SULFUR DIOXIDE. *Preprint, American Chemical Society, New York, 17p., 1973. 13 refs. (Presented at the American Chemical Society, Annual Meeting, Chicago, Ill., Aug. 26-31, 1973.)*

A mercury sampling procedure has been developed and field tested which is operable in the presence of large concentrations of sulfur dioxide and suitable for sampling industrial gas streams. An alkaline prescrubber (sodium carbonate) for SO2 removal is followed by two scrubbers containing a nitric acid/potassium permanganate solution for mercury collection. The prescrubber may be operated for 45 min at a flow rate of about 2 l/min and an SO2 concentration of 80,000 ppm before the solution is exhausted. The long sampling times provide greater analytical sensitivity, as well as a time-integrated sample which is less subject to short-term fluctuations in sample concentration caused by anomalies in process operations. While the mercury collection efficiency is only 80 to 85%, a consistent efficiency of collection was observed; consequently, the low bias may be compensated for with a good degree of confidence. (Author summary modified)

33213 **APTIC NO. 55402**

Strojek, Jerzy and Alfred Tramer

CORRELATION SPECTROPHOTOMETER FOR MEASURING TRACE AMOUNTS OF SO2 IN GASES. *(Korelacyjny spektrofotometr do oznaczania sladowych ilosci SO2 gazach). Text in Polish. Chem. Anal. (Warsaw), 18(4):387-389, 1973. 3 refs.*

A modification of the correlation spectrophotometer for measuring trace amounts of sulfur dioxide in industrial gases is discussed. The light beam is deflected against fixed correlation mask by means of the vibrant mirror of a fast galvanometer. The coil of the galvanometer is supplied with a triangular wave-form generator. The photocurrent is amplified by means of a negative feedback unit, which fixes the dc component of the photocurrent. The sensitivity of the apparatus is expected to allow the measurement of SO2 concentrations of less than 50 ppm.

33214 **APTIC NO. 57091**

Strubert, W.

SEPARATION OF FUSED RING AROMATICS ON SILICA GEL-DETECTION IN THE NANOGRAM OR PPB RANGE. *(Trennung von mehrkernigen Aromaten auf Kieselgel-Detektion im Nanogramm bezw. ppb-Bereich) Chromatographia, 6(4):205-206, April 1973. 6 refs. Translated from German, 7p.*

A high-speed fluid chromatographic system using Spherosil XOA 400, 4-8 micron is described for the separation of fused-ring aromatics down to the level of 2ng or 10 ppb. A 70 cu cm capacity tube filled with silica gel of less than 0.1 mm particle size was employed as a preliminary column, and the elutants used were uvasoles. The substances to be analyzed were dissolved in chloroform and diluted with isooctane. Separation of fused-ring aromatics is illustrated for isooctane as the mobile. The time of analysis can be shortened from 13 to 10 min if cyclohexane is used as the mobile phase; separation, however, is impaired. The technique is at least as accurate as the ones effected by means of GP or partition columns, notwithstanding its inability to separate anthracene-phenanthrene. Varying the pressure flow and/or wave length improves detection, though the limits of detection with respect to concentration can only be extended in the present chromatographic system by an increase in dosage volume. A peak widening becomes noticeable as a consequence of the large dosage volume (dosing time of 8.4 sec). It is also possible to determine quantitatively several non-separated components if a spectrophotometer is available.

33215 **APTIC NO. 55761**

Tarala, Fredrick F.

THE PARTICLE SIZE WAR. *Filtration Eng., 4(3):7-12, May-June 1973.*

A review of filter test methods is presented in relation to the importance of understanding such for the proper application of a given filter. The three most common methods of sample evaluation, i.e., particle count, weight, and optical density, use either a synthetic test dust with a predetermined particle distribution or the contaminant existing in the pervading atmosphere when the test is conducted. The test of air and gas filters for efficiency generally requires sampling of the test dust before and after filtration, and it is important for the consumer of a filter device to understand the nature of each method and the meaning of the efficiency terms used with each. It is sometimes necessary to use a combination of two or more methods in arriving at a particle size versus efficiency rating; this is especially true with a low-efficiency air filter which would have a wide range performance curve. Several of the test codes which are most likely to be used in air and gas filtration are described, and the need for some standardization in filter rating is cited.

33216 **APTIC NO. 55449**

Wagman, Jack and Carl M. Peterson

A CONTINUOUS SIZE CLASSIFIER-ANALYZER FOR AIRBORNE PARTICLES. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Chemistry and Physics Lab. and Environmental Research Corp., St. Paul, Minn., Environmental Protection Agency Contract 68-02-0015, 11p., 1973 (?). 6 refs.*

A new instrument for size classification and analysis of airborne particles is described. It operates by inertial separation of particles from an airstream by impingement in a series of air cavities followed by controlled flow and collection of particle fractions on active filter sites. Particle size distribution data are obtained automatically by means of beta attenuation mass measurement of the filter-deposited size fractions. Current design characteristics of the classifier analyzer include five inertial stages with 50% collection efficiencies at particle diameters in the range of 0.07 to 10 micron for an inlet flow of 283 l/min, followed by a filtration stage for smaller particles. Preliminary performance data have been obtained using spheres containing a mixture of uranine and methylene blue. Advantages of the classifier-analyzer include: capability for aerodynamic size classification and analysis at relatively high aerosol flow rate and without particle pile-up and blow-off as experienced with impactors; automatic acquisition of particle size distribution data; and collection of size fractions in a convenient form for subsequent chemical analyses. (Author abstract)

33217 **APTIC NO. 55403**

Yoshida, Koichi, Noriyuki Koike, Yujiro Tsukamoto, and Kenichi Ogura

ON THE RELATION BETWEEN DRIVING CYCLES AND EXHAUST MASS EMISSION IN THE EXHAUST EMISSION TEST METHOD FOR GASOLINE POWERED VEHICLES. *(Gasorin jidosha no haiki gasu shiken ni okeru soko saikuru to haishutsu juryo to no kanren. Text in Japanese. Kotsu Anzen Kogai Kenkyusho Hokoku (Res. Inst. Traffic Safety Environ. Prot. Rep.), no. 1:79-87, March 1973.*

The relationships between automotive exhaust gas weight (specifically for carbon monoxide, hydrocarbons, and nitrogen oxides) for LA-4, European ECE cycle, and Japanese 10-mode cycle engines were compared by mathematical calculations and actual measurements by the total bag method and the constant volume sampler method. In general, with the 10-mode cycles, the heavier the car, the heavier the weight of each component of exhaust gas. The 10-mode seemed to produce more HC and less NOx than 4-mode. The total bag method of emission weight was unreliable for measurement of NOx. The constant volume sampler method was evaluated by comparison with the direct measurement method and was found viable.

33218 **APTIC NO. 55628**

Yoshida, Tetsuo, Yasuo Mukaizaka, Kikuo Okuyama, and Toshihiro Miyazaki

MEASUREMENT OF GRAIN SIZE DISTRIBUTION AND CONCENTRATION OF AEROSOLS BY AN ULTRAMICROSCOPE. *(Genjai kenibikyo ni yoru earozoru no ryukei bunpu, kosu nodo no sokutei). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 295-296, 1973. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

A method for measuring aerosol particle size with an ultramicroscope is presented. The method was tested on particles of stearic acid, tobacco smoke, and mist. Photographs were taken through the microscope; then particles were counted to obtain grain size distribution and aerosol concentration. Minimum measurable grain size is 0.1 micron. The limit of particle concentration is 10,000 particles/cu cm.

1972

33219 **APTIC NO. 55501**

Analytical Instrument Development, Inc., West Chester, Pa.

THE ANALYSIS OF LOW LEVELS OF CARBON MONOXIDE, METHANE, AND TOTAL HYDROCARBONS. *Preprint, GCAN-124, 4p., 1972.*

Analytical data on low levels of carbon monoxide, methane, and total hydrocarbons at ambient levels are presented. The operation of the Model 514 Portable Air Pollution Analyzer (a gas chromatograph) is described. It is possible to see 0.4 ppm CH4 and 0.5 ppm CO at a signal to noise ratio of 2 to 1. These values are well below the maximum levels as described in the Federal Register. Total hydrocarbons were analyzed on a modified Model 511 Portable Flame Ionization Chromatograph. Excellent reproducibility was obtained with a duplicate analysis of a 45 ppm sample in less than 15 sec/sample. The CH4 concentration can be obtained in approximately 40 sec.

33220 **APTIC NO. 55563**

Frank, Yu. A., A. K. Zhomov, N. I. Kholdyakov, M. I. Yanovskiy, and G. A. Zlobina

COMPACT GAS CHROMATOGRAPHY FOR THE EXPRESS ANALYSIS OF GASEOUS MIXTURES. *(Malogabaritnyy gazovyy khromatograf dlya ekspressnogo analiza smesi gazov). Text in Russian. Neftepererab. Neftekhim., no. 1:47-48, 1972.*

Compact chromatograph for the express analysis of gaseous mixtures containing oxygen, nitrogen, carbon monoxide, methane, carbon dioxide, water vapor, ethane, ethylene, propylene and propane in a single sample is described. The gaseous mixture, together with helium as carrier gas, is first passed through a Poropak column (length 150 cm, diameter 0.4 cm) to remove water vapor, then through an INZ-600 column wetted with adipodinitrile (length 1000 cm, diameter 0.4 cm) at 25 C to remove CO2, and finally through a molecular sieve NaX column (length 150 cm, diameter 0.4 cm) to separate hydrogen, N, O2, CO, and CH4. The three detector cells used for the analysis constitute wings of a catarrhometer. The helium flow rate is 30 ml/min. The analysis time is 9 min.

33221 **APTIC NO. 55515**

Gershenzon, Yu. M., A. P. Dement ev, and F. B. Moin

INTEGRAL DIFFUSION METHOD FOR STUDYING THE KINETICS OF RAPID REACTIONS IN THE RESONATOR OF THE ELECTRON PARAMAGNETIC RESONANCE SPECTROMETER. *(Integral nyy diffuzionnyy metod izucheniya kinetiki bystrykh reaktsiy v rezonatore spektrometra EPR). Text in Russian. Izv. Akad. Nauk SSSR, Ser. Khim., no. 3:609-611, 1972. 5 refs.*

A simple method for the study of the kinetics of rapid reactions occurring between atoms and molecules, and the theory of the integral diffusion method for measuring the rate constants of elementary reactions are described. A diffusional cloud is formed in the resonator space of the electron paramagnetic resonance spectrometer, and the electron paramagnetic resonance signal is measured as a function of the rate of reaction. The atoms or radicals are admitted through a narrow nozzle into the reagent flow, diluted with inert gas. The rate constant of the native o ygen + nitrogen dioxide equals molecular oxygen + nitric oxide reaction was measured by this method at ambiant temperature, at a helium flow rate of 40 m/sec, a pressure of 1-2 mm Hg, and a NO2 concentration of 0.0000000001 M/cu cm. The rate constant of the reaction was 3-5 times 10 to the 12th power cu cm/M/sec.

33222 **APTIC NO. 55386**

Guicherit, R., R. Jeltes, and F. Lindqvist

DETERMINATION OF THE OZONE CONCENTRATION IN OUTDOOR AIR NEAR DELFT, THE NETHERLANDS. *Environ. Pollut., 3(2):91-110, 1972. 25 refs.*

Ozone concentrations in the outdoor air near Delft, The Netherlands were obtained, and various ozone measuring techniques were tested for specificity to ozone as opposed the widely used neutral buffered potassium iodide method which is applicable to total oxidants rather than ozone in particular. The manual spectrophotometric determination of ozone with di (pyridyl)ethylene, which is also claimed to be specific, proved subject to interferences and was therefore rejected as an ozone analyzing technique. Commercially available amperometric coulometric devices were essentially total oxidant meters and were not specific for ozone. The spectrophotometric indigosulphonic acid method was subject to slight interferences by nitrogen dioxide but can be used in recording instruments. A galvanic (coulometric) detection method made specifically for ozone measurements was highly selective. The chemiluminescent reaction between ozone and Rhodamine-B was also highly selective for ozone. Colorimetry and gas chromatography were also tested. The ozone determinations in outdoor air indicated the occurrence of smog-forming conditions in the area examined, and data of outdoor measurements for oxides of nitrogen, hydrocarbons, and aldehydes supported this finding. Ozone values of more than 200 micrograms/cu m were recorded on 25 days during 1969 and 1970.

33223 **APTIC NO. 55597**

Kato, Satoshi

SAMPLING METHOD OF COMBUSTION GASES. *(Nensho gasu sanpuringuho). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(10):79-87, Aug. 1972. 18 refs.*

Sampling and analytical methods to determine combustion gases emitted by an internal combustion engine are described. Carbon monoxide and carbon dioxide can be determined by a nondispersive infrared analyzer or a gas chromatograph. Oxygen and hydrogen are determined by gas chromatographs. Hydrocarbons are determined by gas chromatography or mass analysis with the aid of a flame ionization analyzer. Nitric oxide is determined with an NDIR, and nitrogen dioxide with a nondispersive ultraviolet analyzer.

33224 **APTIC NO. 55544**

Protoyerevskiy, A. S.

PORTABLE GAS CHROMATOGRAPH FOR THE DETERMINATION OF TOXIC SUBSTANCES IN THE AIR. *(Perenosnoy gazovyy khromatograf dlya opredeleniya soderzhaniya toksicheskikh veshchestv v vozdukhe). Text in Russian. Khim Tekhnol., no. 2:59-61, 1972. 5 refs.*

A compact, portable gas chromatograph with a flame ionization detector for the quantitative determination of toxic substances in the air is described. The instrument includes a thermostatized column, pressurized gas containers, and a recorder unit. The carrier gas and hydrogen are dosed at an accuracy not exceeding + or 2% at pressure variations of + or 10%. The hydrogen expenditure can be varied from 0.8 to 3 l/hr. The carrier gas pressure can be varied from 0. to 3.5 kg/sq cm. The output potential of 0-50 mV makes it possible to integrate the instrument in air pollution monitoring networks, while the instrument is especially suitable for measuring the concentration of toxic substances in workplaces. The lower limit of detectability for propane is 0.0000005 micrograms/sec. The minimum determinable concentration is 0.000005% by volume.

33225 **APTIC NO. 55651**

Tomb, T. F., H. N. Treaftis, R. L. Mundell, and P. S. Parobeck

COMPARISON OF RESPIRABLE DUST CONCENTRATIONS MEASURED WITH MRE AND MODIFIED PERSONAL GRAVIMETRIC SAMPLING EQUIPMENT. *Bureau of Mines, RI-7772, 29p., 1972.*

A constant factor was determined for converting dust concentrations measured with personal sampler units modified with appropriate pulsation damping devices to equivalent respirable dust concentrations as measured with an MRE instrument. Currently approved personal sampling units were modified, and an extensive underground sampling program was conducted to relate environmental coal mine dust measurements made with modified personal sampling equipment to measurements obtained simultaneously with the MRE instrument. Empirical relationships derived from statistical treatment of the data are compared to a constant factor theoretically derived by comparing calculated mass penetration for the respective instruments using a typical coal mine aerosol distribution. The results indicated that a constant factor of 1.38 should be used to convert underground respirable dust measurements obtained with modified personal sampling equipment to equivalent MRE concentrations. (Author summary)

33226 **APTIC NO. 55461**

Yoon, Frank and Louis B. Pierce

THE PREPARATION OF A STANDARD GAS MIXTURE OF C5 AND C6 HYDROCARBONS AT A CONCENTRATION OF 0.05 PPM. *California State Dept. of Public Health, Berkeley, Calif., Air and Industrial Hygiene Lab., AIHL Rept. 109, 12p., May, 1972. 4 refs.*

A method is described for the preparation of a standard hydrocarbon gas mixture useful for calibrating a gas chromatograph in the process of quantifying atmospheric C5 and C6 hydrocarbons in the 0.1-1 ppb concentration range. The mixture was made with 12 C5 and C6 hydrocarbons, liquid at room temperatures, in synthetic air at a concentration of 0.05 ppm for each compound. Stainless steel preparation cylinder wall losses were satisfied by conditioning the wall with all of the compounds. Standard volumes of the equilibrium hydrocarbon vapor-air mixtures were calculated with a formula based on Dalton s Law of Partial Pressure and Amagat s Law of Parial Volume. Standard volumes were withdrawn from special flasks and transferred into the cylinder. Gas chromatographic analyses of the hydrocarbons were statistically examined, and a discussion is presented on the results.

33227 **APTIC NO. 55596**

Yoshida, Koichi

ANALYSIS OF COMBUSTION GASES. *(Nensho gasu no bunseki). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(10):88-93, Aug. 1972. 14 refs.*

Methods of analyzing internal combustion engine exhausts are discussed. Continuous methods for carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides include nondispersion infrared analysis, chemiluminescence (for NOx), and flame ionization (for total HC). Intermittent analyses include gas chromatography and colorimetry (for NOx). Detector tubes and volumetric methods are also mentioned. Calibration methods and analytical procedures for NDIR analysis are discussed.

1971

33228 **APTIC NO. 55530**

Hanst, Philip, Jules Lehmann, Henry Reichle, and Morris Tepper

REMOTE DETECTION OF AIR AND WATER POLLUTION FROM SATELLITES AND/OR AIRPLANES. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, MIT Press, 1971, p. 502-526. 18 refs.*

Techniques for the detection of gaseous, trace, and particulate atmospheric pollutants from satellites and/or airplanes are described. Much of the research involving the use of lasers for the remote detection of gaseous pollutants is based on the use of Raman scattering. The present equipment cannot detect air pollutants at the concentrations at which they are found in the atmosphere. A nondispersive infrared technique using earth radiation is being developed for testing from an airplane. A correlation interferometer which combines absorption spectroscopy, with scanning interferometry for measurements of trace constituents and pollutants in the atmosphere is described. Development of the device is directed at measurement of carbon monoxide in range from 10 ppb to 10 ppm. At least three techniques have been proposed for the measurement of particulate or aerosol distribution. One of these is a laser technique and two are techniques that use the sun as a radiation source.

33229 **APTIC NO. 55521**

Kimura, Kikuji

SPECTROSCOPIC ANALYSIS OF DUST. *(Spektralanalytisches Untersuchungsverfahren fuer auf Filterpapier gesammelte Staubproben). Text in German. (Shibata Kagaku Kikai Kogyo K. K., Tokyo, (Japan)) W. Ger. Pat. Appl. 2,235,718. 30p., July 20, 1971. 6 refs. (9 claims).*

The dust concentration in the air was determined by sucking the air through a filter and measuring the absorbance of the precipitate by monochromatic light of a wavelength 360-390 nm and relating the results to a standard curve. The ratios of different particle types were determined by successively measuring the absorbances for different wavelengths and relating the ratios of the absorbances to standard curves.

33230 **APTIC NO. 55520**

Menschick, Hubert

DETECTOR FOR SOLVENT VAPORS IN AIR. *(Verfahren und Geraet zum Bestimmen und Oeberwachen von Loesemittel- und Gasmengen in Luft). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,136,632. 9p., July 22, 1971. 4 refs. (8 claims).*

The preparation of a detector for solvent vapors in air is described. The lower explosion limit for solvent vapors is a drying chamber was determied by passing a fresh air flow over a flashback safety device into a combustion chamber. The solvent to be analyzed was added until ignition (100% lower explosion limit) occurred, introducing the test air instead of the fresh air, and reducing the solvent addition until the flame was extinguished. The difference between ignition and extinguishing point was read from the dosing device and gave the solvent concentration in question. When the dosing device is adjusted to 50% lower explosion limit, a danger signal is given in case of ignition in the combustion chamber.

33231 **APTIC NO. 55551**

Pate, John B. and Richard D. Cadle

CHEMICAL ANALYTICAL METHODS USED BY THE NATIONAL CENTER FOR ATMOSPHERIC RESEACH. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, Mass., MIT Press, 1971, Chapt. 41, p. 462-480. 36 refs.*

The techniques currently used by the National Center for Atmospheric Research in its investigation of atmospheric Chemistry of remote and unpolluted areas are described. A bubbler apparatus, which is designed to permit an atmospheric sample to be bubbled through an aqueous collecting solution, is used to determine trace gases and vapors. Methods for determining the following trace gases are discussed: sulfur dioxide, ammonia, nitrogen dioxide, nitric oxide, aliphatic aldehydes, hydrogen sulfide, hydrocarbons, nitrous oxide, and ozone. Most of the atmospheric particles to be measured are extremely small, requiring either the accumulation of large samples over long periods of time, or the use of extremely sensitive analytical techniques. The bulk collection of particles is discussed in terms of filter samples, the sulfur content of bulk samples, and miscellaneous bulk samples. Individual particle analysis is discussed in terms of morphology, total size and count, and the size and count of specific components.

33232 **APTIC NO. 55409**

Saltzman, Robert S. and James A. Williamson

MONITORING STATIONARY SOURCE EMISSIONS FOR AIR POLLUTANTS WITH PHOTOMETRIC ANALYZER SYSTEMS. *Anal. Instrum., vol. 9:1-6, 1971. 3 refs.*

A completely packaged photometric analyzer and sampling system for the continuous monitoring of stationary source sulfur dioxide and nitrogen oxide stack emissions is described. The photometric analyzer measures the selective ultraviolet or visible light absorption of the component and is designed primarily for monitoring and control of process stream composition. The measuring wavelength for sulfur dioxide is 302 nm, and that for nitrogen dioxide detection is 436 nm. High pressure oxygen may be used to convert nitric oxide to nitrogen dioxide for photometric measurement. The sample handling components, including the sample cell, are kept at elevated temperatures to avoid condensation and resultant problems with corrosion and nonrepresentative sampling and to allow for a simplified sample system, particularly on flue gases. Flow rates are maintained at about 6-7 cu ft/hr; at this flow rate the analyzer response time for a sample run of 100 ft is about 15 sec. Comparison with wet chemical tests for SO_2 and NO_x have resulted in a correlation within plus or minus 2% of full scale.

1969

33233 **APTIC NO. 57079**

Pitak, O.

GAS CHROMATOGRAPHY OF INORGANIC FLUORINE COMPOUNDS. *Chromatographia, 2(7):304-308, 1969. 40 refs. Translated from German, 9p.*

A gas chromatograph for the analysis of volatile fluorides produced during the dry conversion processing of nuclear fuel by the fluoride method is described. Materials resistant to fluorine corrosion are used in the construction of the chromatograph. Removal of traces of water from the carrier gas is accomplished by a hygrometric detector added after the sorption columns. A modified electron capture detector accomplishes the small quantity analysis of corrosive material and reduces insensitivity to changes in pressure, flow, and temperature of the carrier gas. The detector allows the use of a temperature-programmed procedure.

1968

33234 **APTIC NO. 55527**

Hall, James J.

AN APPLICATION OF A SPACE TECHNIQUE FOR POLLUTION DETECTION. *Preprint, Boeing Co., Kennedy Space Center, Fla., 20p., 1968 (?). 7 refs.*

A system used during Apollo-Saturn launch vehicle testing to identify and analyze extremely minute amounts of gas is described. The system is called the Hazardous Gas Detection System and consists of a mass spectrometer operating under a high vacuum condition that is created by a fore pump and diffusion pump. This low pressure condition must exist before gas sampling can begin. The mass spectrometer has the ability to measure both qualitatively and quantitatively the presence and percentage of certain gases of interest, sensed by the vehicle probes. These gases are hydrogen, helium, nitrogen, oxygen, nitrogen tetroxide, and hydrazine N_2H_3 radical or any gas whose molecular weight is between 2 and 150 AMU.

1967

33235 **APTIC NO. 57072**

Kessler, Horst and Eugen Mueller

THIN LAYER CHROMATOGRAPHIC SEPARATION OF POLYNUCLEAR AROMATICS WITH PICRIC ACID AS A COMPLEX FORMER. *(Dunnschichtchromatographische Trennung mehrkerniger Aromatin mit Pikrinsaure als Komplexbildner). Preprint, 1967 (?). 8 refs. Translated from German, 7p.*

A method for thin layer chromatographic separation of polynuclear aromatics with picric acid as a complex former is presented which may be applied to compounds too unstable thermally to be analyzed by gas chromatography. The thin layer plates are prepared in the usual manner, using as a sorption layer silica gel GF 254 (with fluorescence indicator). Picric acid is applied as a complex former, and to avoid the necessity of separating the complex former from the separated substances in a subsequent operation, only the lower half of the plate is coated. The substances separated in the first zone are separated from the complex former when they arrive at the uncoated second zone. Subsequent to drying, they can be demonstrated directly in ultraviolet light or separated preparatively. Relative migration rates for 21 hydrocarbons are given in tabular form for thin layer separation with chamber saturation, without chamber saturation, and on the coated plate without chamber saturation.

1960

33236 **APTIC NO. 57044**

Olaf, Jorn

PARTICLE SIZE ANALYSES OF MINE DUSTS. *(Korngroessenanalysen von Grubenstaeuben). Staub, Reinhaltung der Luft, 20(2):40-46, Feb. 1, 1960. 48 refs. Translated from German, 25p.*

The method of determination of particle sizes by optical sedimentation has been subjected to careful theoretical examination and several errors appeared whenever the dust to be analyzed is non-uniform in nature or in particle size. It is impossible to estimate the error and introduce corrections into measured values because of the different origins of dusts and the different percent composition of total dust. Optical evaluation of sedimentation analysis clearly shows that calculation of technical data in the particle size range which is of interest for analysis of coal mine dusts is impractical, and empirical evaluation of the experimental results is impossible. (Author abstract modified)

1953

33237 **APTIC NO. 55493**

Lugg, G. A. and A. S. Wright

THE DETERMINATION OF TOXIC GASES AND VAPOURS IN AIR. *Commonwealth of Australia, Maribyrnong, Victoria, Dept. of Supply, Defence Research Labs., Cir. 14, 51p., June 1953. 24 refs.*

Methods for the estimation of low concentrations of toxic contaminants in the air are presented. Detailed instructions were prepared for 21 substances based on their determination in air at concentrations at and below those scheduled in the Victorian Health Act. The work is largely standardized around bead and plain bubblers. The toxic substances are ammonia, amyl acetate, aniline, arsine, butyl acetate, carbon monoxide, carbon tetrachloride, chloroform, chromic acid, ethylene dichloride, ethyl acetate, formaldehyde, hydrogen cyanide, mercury vapor, nitroglycerin, nitrous fumes, ozone, sulfur dioxide, tetrachlorethane, tetrachlorethylene, and trichloroethylene.

AIR QUALITY MEASUREMENTS

1973

33238 **APTIC NO. 55454**

Office of Air and Water Programs, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

NATIONAL AIR QUALITY LEVELS AND TRENDS IN TOTAL SUSPENDED PARTICULATES AND SULFUR DIOXIDE DETERMINED BY DATA IN THE NATIONAL AIR SURVEILLANCE NETWORK. *Preprint, 40p., April 1973.*

Data collected through the National Air Surveillance Network for the past 12 years have been examined for trends in ambient levels of suspended particulates (TSP) and sulfur dioxide. Both TSP and SO2 concentrations at most center city sites have declined significantly over the 12 year period. Stations with the highest concentrations in the early 1960's have generally shown the greatest improvement. The average center-city TSP concentration has decreased by approximately 20% while SO2 concentrations have shown a much greater improvement, decreasing by approximately 50%. These improvements in air quality have primarily resulted from the increased use of cleaner-burning fuels in the residential, commercial, and industrial sectors of most urban areas. Local and State air pollution regulations limiting the use of coal and high-sulfur fuels have resulted in increased use of low-sulfur oil and natural gas as the primary sources of energy. The results presented are preliminary and will be further developed as State air quality information is included in the trends evaluation. (Author abstract modified)

33239 **APTIC NO. 55626**

Japan Federation of Bar Assoc., Committee for Control of Environmental Pollution

A REPORT OF THE SECOND INVESTIGATION ON FUJI POLLUTION -- THE APPLICATION OF SEVERAL POLLUTION LAWS AND ITS PRESENT SITUATION. *(Fuji kogai dai-nikai chosa hokoku -- kogai shoho no unyo to sono genjitsu). Text in Japanese. 75p., Aug. 1973.*

The Air Pollution Prevention Law presented emission and air quality standards. Since the law's passage, 22 facilities using heavy oil have been constructed in Fuji city according to the law. The average sulfur oxide concentration exceeded the standard of less than 0.05 ppm until 1970. In 1971, SOx pollution decreased to below the standard. At several points pollution increased, although it did not exceed the standard. In an area at the foot of Mt. Fuji, concentrations of 0.01 ppm occurred. Although dust fall decreased, floating dust increased.

33240 **APTIC NO. 55660**

Osaka Prefectural Government (Japan)

THE 1972 REPORTS ON POLLUTION CONDITIONS AND ENVIRONMENTAL PROTECTION MEASURES IN OSAKA. *(Showa-47-nendo ni okeru kogai no jokyo oyobi kogai no boshi ni kanshite kojita shisaku ni kansuru hokoku). Text in Japanese. Sept. 1973. 448p.*

The topographical and meteorological characteristics of the Osaka area, the weather factors that affect air pollution, the fuel consumption, sulfur oxides emission, the transition of fuel consumption over the years, the transition of sulfur oxide emissions, the transition of average sulfur content in heavy oil and the amount of oil consumption by industrial classifications, the increase of automobile traffic and automotive emission gases, the number of privately owned automobiles, the automotive fuel consumption and traffic amount, and the total quantity of air pollutant emissions in the Osaka area are discussed. The measurements of sulfur oxides, suspended particulates, settling particles, carbon monoxide, nitrogen oxides, oxidants, hydrocarbons, and photochemical smog are also topics of the survey of pollution conditions. The topics on control measures include legislation, the control methods for pollution emission facilities, guidance and advice, continuous monitoring programs for air quality and emission sources, emergency activities, plans for new blue sky, photochemical smog, and emergency countermeasures, investigation and research programs on photochemical smogs, control measures against automotive emissions, and aircraft emission are discussed. The measurements taken near the Osaka International Airport between June and July 1972 showed an average of 0.084 mg/cu m of suspended particulates (0.24 mg maximum), 2.9 ppm of carbon monoxide (maximum 5 ppm), 0.017 ppm of sulfur oxides, 0.023 ppm of nitric oxide (0.22 ppm maximum), and 0.032 ppm of nitrogen dioxide (0.16 ppm maximum).

33241 **APTIC NO. 55644**

Aoki, Kazuyuki

SPECTRUM ANALYSIS OF AIR POLLUTANT CONCENTRATION. CORRELATION OF CO AND C3. *(Taiki osenshitsu nodo no supekutoru kaiseki--CO to O3 no sokan ni tsuite). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 288, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 39.)*

In the analysis of data obtained by quick pollution monitoring devices, hourly averages are taken as the basis of analysis and random fluctuations are discarded by leveling the fluctuating measurements of each hour. Vector analyses applied to these random fluctuations will reveal much information concerning dispersion of pollutants and mutual reactions of pollutants. When the time constant linear system is hypothesized, the system frequency response function can be obtained from the input power spectrum density function and the input-output cross spectrum density function. Here, using the theory, concentration of carbon monoxide and ozone at the same location were analyzed, using quick response meters. The power spectrum, density function, coherency, and frequency response function were checked. The data showed that there was a minus correlation between ozone and CO, and when ozone and CO coexisted, ozone in the amount of approximately 1.5% of CO was decomposed. The main decomposition reaction factor may be nitric oxide emitted with CO.

33242 **APTIC NO. 55330**

Goto, Takao

HISTOGRAPHY AND MEAN VALUE. *(Heikin nodo to hindo bunpu). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 289, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 40.)*

Actual measurements of air pollutants and computer predictions were compared. Figures obtained by the Sutton formula and actual measurements agreed well. Histographical studies of measurements at nine locations in Osaka are presented. The addition of mean values of each pollutant (sulfur dioxide, dusts, and nitrogen dioxide), and the counts of compounds of these pollutants are quite different in all cases. Also, the error percentages of single pollutant measurements and those of compounds are quite different. The mean SO2 counts range, for nine locations, between 32 and 63 ppb, and the errors range between 30 and 50%. The mean counts of dusts varied between 33 and 156 micrograms, and errors of each location varied between 57 and 109%. Nitrogen dioxide counts were between 38 and 60 ppb, and errors varied between 36 and 52%. The compounds of SO2 plus 1/2 dusts varied between 46 and 95, and the errors varied between 37 and 46%; SO2 plus NO2 plus 1/2 dusts varied between 83 and 157, and errors between 27 and 42%.

33243 **APTIC NO. 55646**

Inouye, Rikita and Yuji Watanabe

STATISTICAL PROPERTIES OF SULFUR OXIDES CONCENTRATIONS AT CONTINUOUS MONITORING STATIONS IN JAPAN. *(Jido sokuteiki ni yoru nisanka io nodo sokuteki-chi no tokeiteki seishitsu ni tsuite). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 285, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 36.)*

Sulfur dioxide concentration distributions can be expressed by a logarithmic distribution pattern. When the mathematical average count of SO2 for a year is a certain figure and the hourly measurements are 99%, and if it is assumed that the concentration distribution is logarithmic, the relationship between the year's mathematical average and the year's geometrical average shows a linear relationship with a rather small measure of dispersion. The 1969, 1970, and 1971 measurement data for Japan were analyzed by this method and the regression line, standard errors, and correlation coefficients were obtained. The analysis showed that the logarithm of standard geometric errors of concentration distribution are gradually becoming smaller. From the yearly average, hourly index and daily average can be predicted. When two elements are known instead of one, the accuracy of these figures can be examined. The best results were obtained when the yearly mathematical average, and the maximum daily average for the year are known. Improvement of the figure calculated from one element is negligible.

33244 **APTIC NO. 55323**

Ito, M., T. Odaira, S. Fukuoka, M. Udagawa, M. Funashima, M. Kurose, and H. Nakaura

REGIONAL RESPRESENTATIVENESS OF OXIDANTS CONCENTRATION. *(Okishidanto nodo no chiiki daihyosei ni tsuite). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 286, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 37.)*

Regional representative types of oxidant concentration levels were studied using the data obtained by continuous monitoring at several locations in Tokyo suburbs. The locations and hourly averages are presented. The hourly measurements were statistically analyzed. The correlations between measuring locations were good, but the relationship between correlation coefficients and distances was not clear. The square average of concentration differences seemed more significant by showing regional characteristics. The correlations of distances between measuring locations and concentration differences are shown. In areas covering distances of 20-30 km, there is a time difference of 1-3 hr. To calculate mutual dispersion factors, a representative location among the seven was chosen. An average oxidant concentration level can be accurately obtained for areas of approximately 1.5 km radius.

33245 **APTIC NO. 55645**

Izumi, Yoshihiro, Toshitake Kirimoto, Tomiji Nakashima, and Hiroshi Yoshida

CARBON MONOXIDE IN CROSS ROAD. *(Kosaten ni okeru issanka tanso nodo haaku no tame no ichi kosatsu). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 295, 1973. 1 ref. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 46.)*

Carbon monoxide concentrations were measured at a traffic intersection with an average building height of 20 m and road width of 16 m. Air samples were taken for 10 min by a vinyl hose and analyzed by infrared spectrometry. The plumb distribution, traffic amount, and average car speed were checked. Existing data on traffic quantity, traffic density, and wind velocity were used. Average CO concentrations at four corners of the intersection were formulated into a regression formula and correlations with the traffic quantity, traffic density, and wind velocity were checked. Emission sources, buildings, and wind velocity, and to certain extent, wind direction, were controlling factors. Further studies will be made on the building height/road width and the distance from the intersection to the measuring point, and more accurate regression formulas will be obtained.

33246 **APTIC NO. 55757**

Kelley, J. J.

SURFACE OZONE IN THE ARCTIC ATMOSPHERE. *Pure Appl. Geophys. (Basel), 106-108:1106-1115, 1973. 7 refs.*

Near-surface atmospheric ozone measurements were made at Barrow, Alaska between January 1965 and September 1967. Ozone was continuously monitored via microcoulometric analysis at a level of 2 m above the ground. Daily ozone concentrations near the ground varied from 7 to less than 1 pphm by volume. The highest concentrations occurred in the spring and showed sharp increases lasting from several hours to a few days. These sudden rises in ozone concentrations were correlated with storm front passages. The concentration of surface ozone from late spring through the summer and fall showed less variability from day to day than in the spring. The lowest ozone concentrations occurred from late May to early June. (Author abstract)

33247 **APTIC NO. 55430**

Metvalli, Z.

SOME RESULTS OF OBSERVATIONS OF ATMOSPHERIC OZONE IN CAIRO FOR 1967-1969. *(Nekotoryye rezul ty nablyudeniy atmosfernogo ozona v Kaire v 1967-1969 gg). Text in Russian. Meteorol. i Gidrol., no. 8:41-45, 1973. 2 refs.*

The annual concentration of total ozone content over Cairo was obtained from observations carried out from March 1967 to Oct. 1968. The maximum was in April and minimum in Oct. The annual amplitude reached 14% of the mean annual content of O3. (Author abstract modified)

33248 **APTIC NO. 55334**

Ohira, Toshio and Mitsuru Udagawa

MEASUREMENT OF AIR POLLUTION AND DATA PROCESSING (NO. 6). *(Taiki osen no sokutei to deta shori (sono 6)). Text in Japaaese. Bunseki Kiki (Analysis Instr.), 11(3):193-202, March 1973.*

Air pollution data analysis is discussed. Grouping a population into several groups based on influencing factors can be effective. Examples of grouping using a mathematical procedure are given. Measuring points and pollutants at each point can be grouped. When grouping pollutants, meteorology, air quality, and source emission strength must be considered. A simple correlation matrix for each factor in an example is given.

33249 **APTIC NO. 55686**

Piscalar, F.

OZONE RELATED SPECTRAL MEASUREMENTS OF TOTAL SOLAR RADIATION. *Pure Appl. Geophys. (Basel), vol. 106-108:1290-1301, 1973. 1 ref.*

For 4 years, measurements of solar radiation were made in Cologne with an instrument which observes the sky radiance in two spectral regions. The measured incident radiation is independent of the direction. Formulae are derived which allow one to conclude the daily sun intensity in ore region with knowledge of the measured intensity in another region. The effect of ozone is noticeable in the difference between the measured and computed values in an ozone-absorbing region. The optical behavior of the atmosphere can be defined via parameterization of the extinction effects. From this, one can conclude the intensity of any other spectral region and thus define the selective influences of other absorbing gases such as air pollution constituents. (Author abstract)

33250 **APTIC NO. 55328**

Su, Chih-Wu and Edward D. Goldberg

CHLOROFLUOROCARBONS IN THE ATMOSPHERE. *Nature (London), 245(5419):27, Sept. 1973. 7 refs.*

The levels of trichlorofluoromethane and dichlorofluoromethane in the atmosphere of Southern California were determined. Analyses were carried out with a gas chromatograph fitted with an electron capture detector and a column using Porapak T. The air was sampled in brass tubing. In samples taken from the industrialized area of San Diego and the adjacent desert regions, dichlorofluoromethane was more abundant than trichlorofluoromethane. The substantially smaller abundance of the latter is probably related to the relative instability of its carbon-chlorine bonds. The residence time of dichlorofluoromethane in the atmosphere is estimated to be about 30 years, which is substantially longer than the 10 year residence time estimated for trichlorofluoromethane.

33251 **APTIC NO. 55604**

Szabo, Maria and Katalin Kollar

NOTE ON THE EVOLUTION OF THE AIR POLLUTION IN BUDAPEST DURING THE SECOND HALF OF 1972. *(Tajekoztato Budapest 1972. II. felevi levegoszennyezettsegenek alakulasarol). Text in Hungarian. Budapesti Kozegeszsegugy, no. 2:58-60, 1973.*

Results of systematic air pollution monitoring conducted in Budapest during the second half of 1972 are presented and compared with corresponding measurement data for the identical periods in 1970 and 1971. The total sulfur pollution decreased in all months but in November and December when the standard of 10 mg/100 hr was exceeded. Increased settling dust values in July and August, and reduced dust sedimentation values, well below the maximum allowable value of 12.5 g/sq m, in all other months were measured. A suprisingly high increase in the sulfur dioxide concentrations, especially during November and August was noted. In these two months, the SO2 concentrations, measured as 20-minute values, were in the respective ranges of 0.32-0.60 and 0.29-0.91 mg/cu m. In the summer period, the SO2 average concentrations were below the maximum allowable value of 0.15 mg/cu m. The nitrogen oxides concentrations ranged from 0.09 to 0.20 mg/cu m and thus were substantially higher than the maximum allowable concentration of 0.05 mg/cu m. The chlorine pollution increased considerably, reaching a peak value of 0.30 mg/cu m, during the second half of 1972.

33252 **APTIC NO. 55685**

Vigroux, E.

HIGH RESOLUTION ANALYSIS OF THE SUN S RADIATION RECEIVED AT THE GROUND FROM 9 MICRON TO 11.6 MICRON. *Pure Appl. Geophys. (Basel), vol. 106-108:1336-1340, 1973. 7 refs.*

The instrumentation required for the ground level observation of the absorption of solar radiation in the 9 to 11.6 micron spectral region through the terrestrial atmosphere is discussed, along with the results which have been obtained for the water, ozone, and nitric acid molecules. The observations were made at Montlouis, in southern France, at 1650 m above sea level. Due to a relative absence of industry and local domestic activity, the air pollution in this region is low. The intention was to study the weak absorption of the terrestrial atmosphere around and beyond 10 micron, necessitating the observation of large air masses during cold weather at sunset. The theoretical and observational results are reported. (Author summary modified)

1972

33253 **APTIC NO. 55370**

Sakai Municipal Government (Japan)

PUBLIC NUISANCE IN SAKAI (1972). *(Sakai no kogai) (Showa 47- Nenban). Text in Japanese. 241p., Nov. 1972.*

Air pollution conditions in Sakai over the last several years are reviewed. The meteorological factors specially contributing to air pollution dispersion are the wind direction and velocity; heavy concentrations of sulfur oxides seem to occur when the wind is west to north and of suspended particulates when the wind is east to south. For both, high concentrations occur when the wind is within 0.6-5 m/sec. The fuel oil consumption in Sakai increased 60.7% between 1967 and 1970 (1970 consumption 38,260,000 kl), but the increase rate is dropping every year. The consumption of coal has decreased approximately 50% between 1969 and 1970, and was 1000 tons for 1970. The measurements of sulfur dioxide annual averages are dropping gradually, by both electroconductivity and lead dioxide methods. The 1971-1972 measurements show that there was a sudden drop in December and a drastic increase in January for the sulfur oxides levels in all areas of Sakai, but especially for those in the coastal area. The suspended particulate measurements were the highest in 1966, and for the last several years, the level has been in the area of 0.10-0.15 mg/cu m. However, occasionally exceptionally high counts are obtained locally. In December 1971, the highest count was 766 micrograms/cu m in one area. The measurements of iron, manganese, lead, tin, vanadium, copper, and nickel in suspended particulates are presented. For 1972, as of August, 19 smog warnings had been issued, but there was no critical condition. There were 281 complaints registered in 1972.

33254 **APTIC NO. 55627**

Fukuoka Municipal Government (Japan), Bureau of Public Health

THE ACTUAL CONDITION OF POLLUTION AND COUNTERMEASURES AGAINST IT IN FISCAL 1971. *(Kogai no genjo to taisaku -- Showa 46 nendo). Text in Japanese. 126p., Oct. 1972.*

Air pollution in Fukuoka city is mainly due to the combustion of heavy oil in domestic heating and automobiles. Air pollution measuring stations were increased as the pollution increased. The revised air pollution control law was applied to Fukuoka. Sulfur oxides were measured with the conductivity method and the lead dioxide method; the 1-hour value exceeded 0.1 ppm from November through March. Measurements by the lead dioxide method gave an annual average value of 0.41 mg/100 sq cm/day for all measuring points, the monthly average maximum value was 1.52 mg/100 sq cm/day.

33255 **APTIC NO. 55305**

Kitamura, T., T. Ogura, M. Katada, N. Osaki, M. Kondo, K. Takeda, and K. Yoshizumi

EXHAUST GAS AND NOISE POLLUTION BY AUTOMOBILE IN TOKUSHIMA PREFECTURE. PART IV. *(Tokushima-ken ni okeru jidosha haishutsu gasu ni yoru kankyo osen oyobi kotsu souon no jittai chosa ni tsuite. Dai 4 ho). Text in Japanese. Tokushima-ken Eisei Kenkyusho Nenpo (Ann. Rept. Tokushima Prefect. Public Health Lab.), no. 11:55-69, May 1972.*

Air and noise pollution from automobiles was studied at 10 places along three national highways in Tokushima Prefecture. A maximum of 4000 cars/hr passed a center city point and 1000 cars/hr at other places. The carbon monoxide concentration was less than the environmental standard; the maximum CO concentration was 5.4 ppm. The maximum nitrogen dioxide concentration in the day was 0.145 ppm; the ratio of nitric oxide to NO2 was about two. Suspended particulates were 0.3-0.8 mg/cu m by a high-volume sampler and 0.1-0.3 mg/cu m by a cascade sampler; these values exceeded the standard. About 35-55% of the particulates had diameters of less than 2.0 micron. Maximum lead concentration was 1.41 micrograms/cu m; average was 1 microgram/cu m. Eighty percent of the lead particulates had diameters of less than 2 micron.

33256 **APTIC NO. 55306**

Kitamura, T., T. Ogura, M. Katada, and N. Osaki

SURVEY OF THE AIR POLLUTION IN TOKUSHIMA PREFECTURE. PART XI. MEASUREMENT OF SULFUR DIOXIDE CONCENTRATION BY THE LEAD DIOXIDE METHOD. *(Tokushima-ken ni okeru taiki osen chosa. Dai 11 po. Nisanka namari ho ni yoru aryusan gasu nodo no sokutei kekka ni tsuite). Text in Japanese. Tokushima-ken Eisei Kenkyusho Nenpo (Ann. Rept. Tokushima Prefect. Public Health Lab.), no. 11:1-4, May 1972. 3 refs.*

Sulfur dioxide concentrations were measured at 52 points in Tokushima Prefecture in 1971. Sulfur dioxide was adsorbed on lead dioxide on an unglazed procelain cylinder and analyzed by barium chloroanilate colorimetry. At three points in the Imakiri industrial district which covers Tokushima city and Kitashima village, the mean concentration of SO2 exceeded 1.0 mg/day/100 sq cm PbO2. The value is thought to come from SO2 gas exhausted from a viscose rayon factory located in this district. Concentrations of SO2 in other districts were below 0.5 mg/day/100 sq cm PbO2.

33257 **APTIC NO. 55307**

Kitamura, T., I. Tahara, T. Ogura, M. Katada, and N. Osaki

SURVEY OF THE AIR POLLUTION IN TOKUSHIMA PREFECTURE. PART XII. MEASUREMENT OF CONCENTRATIONS OF SULFUR DIOXIDE AND SUSPENDED PARTICULATE BY AIR POLLUTION AUTO-ANALYZER, AND ANEMOMETRIC AND ANEMOSCOPIC OBSERVATIONS. *(Tokushima-ken ni okeru taiki osen chosa. Dai 12 ho. Taiki osen jidosokuteisochi ni yoru aryusan gasu oyobi fuyufunjin no sokutei kekka narabini jiki fuko fusokuki ni yoru kisho kansoku kekka ni tsuite). Text in Japanese. Tokushima-ken Eisei Kenkyusho Nenpo (Ann. Rept. Tokushima Prefect. Public Health Lab.), no. 11:5-36, May 1972.*

Automatic measurements of air pollution and of the strength and direction of wind were carried out through 1971 at northeastern and southeastern areas in Tokushima Prefecture. The mean concentrations of sulfur dioxide and suspended particulates were 0.026 ppm and 0.084 mg/cu m, respectively, at the northeastern district; they were 0.017 ppm and 0.069 mg/cu m, respectively, at the southeastern district. The SO2 concentrations were below the environmental standard and the particulate concentration exceeded the standard. Anemometric and anemoscopic observations showed that wind direction was mainly northwest to southeast from September to March and from southeast to northwest from July to August. In April and May, northwest to southeast wind was of comparable frequency to the southeast to northwest wind.

33258 **APTIC NO. 55308**

Kitamura, T., T. Ogura, M. Katada, N. Osaki, H. Saito, W. Imase, M. Kondo, K. Takeda, and K. Yoshizumi

SURVEY OF THE AIR POLLUTION IN TOKUSHIMA PREFECTURE. PART XIII. MEASUREMENT OF CHLORINE AND HYDROGEN CHLORIDE CONCENTRATIONS. *(Tokushima-ken ni okeru taiki osen chosa. Dai 13 po. Enso oyobi enka suiso nodo no sokutei kekka ni tsuite). Text in Japanese. Tokushima-ken Eisei Kenkyusho Nenpo (Ann. Rept. Tokushima Prefect. Public Health Lab.), no. 11:37-42, May 1972.*

Concentration of chlorine and hydrogen chloride in the Ikushima industrial district in the eastern part of Tokushima Prefecture, where two factories exhausting chlorine and hydrogen chloride gases exist, were measured. The gases were trapped into adsorbents through an air-autosampler with an absorption rate of 1 l/min for an hour and analyzed by the orthotoluidine method (for Cl2) and the mercuric thiocyanate method (for HCl). Chlorine concentrations of stack gases were reduced from 52.5-265 ppm of the pre-treatment value to 0-7.3 ppm, and the HCl concentration decreased from the 63,000 ppm of the pre-treatment value to less than 20.3 ppm by degassing treatments in the factories. In the vicinities of the factories, Cl2 gas was not detected at all, while a maximum 0.10 ppm of HCl was detected in the area of downstream wind direction from the factories. From this survey, Tokushima Prefecture set a maximum environmental standard of 20 mg/N cu m for Cl2 and 50 mg/N cu m for HCl to prevent complex air pollution. This standard is more strict than the national environmental standard.

1971

33259 **APTIC NO. 55547**

Machta, Lester and E. Hughes

ATMOSPHERIC OXYGEN IN 1967 TO 1970. *In: Man's Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, Mass., MIT Press, 1971, Chapt. 39, p 449-456. 14 refs. (Also: Science, vol. 168:1582-1584, June 26, 1970).*

The 1967-1970 abundance of oxygen in clean air, 20.946% by volume of dry air, is statistically the same as all the reliable measurements since 1910; the extreme range among reported values is 0.007% of volume. The accuracy of the present oxygen standards is + or 0.006% by volume. This latter uncertainty rather than the georgraphic or instrumental variability may limit the detection of small changes in atmospheric oxygen in the future. Further periodic examination of the oxygen content is planned after more accurate standards are developed. While new measurements may show if there has been destruction of oxygen sources by pollution, comparison of present and past observations would indicate whether there has been any recent degredation of atmospheric oxygen. It is likely that fuel burning would slightly decrease O2 content. There were slight decreases in O2 in cities coinciding with high carbon dioxide values. (Author summary modified)

1970

33260 **APTIC NO. 55580**

Blosser, E. R.

A STUDY OF THE NATURE OF THE CHEMICAL CHARACTERISTICS OF PARTICULATES COLLECTED FROM AMBIENT AIR (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., National Air Pollution Control Administration Contract CPA 22-69-153, Rept. APTD-1519, 76p., Aug. 14, 1970.*

NTIS: PB 220401

The complete elemental composition of particulate material collected from the ambient air of six urban locations is presented. The air particulates in each of the six cities were found to be similar to a first approximation, with carbon, silicon, calcium, aluminum, sodium, iron, sulfur, and lead predominating. Roughly one-half of the particulate matter was benzene soluble or organic, while the other half was fount to be mainly silica. The elemental data obtained are summarized in tabular form, and the range found for each element in the six locations, together with a typical value, is also presented. Specific data for each city and other data generated in the study are included. The tabulated and pictorial data can be used directly to describe the levels of specific elements in urban air and can also be used in studies describing the compounds and materials that comprise the particulates.

33261 **APTIC NO. 55463**

Wyszynska, Halina, Artur Strusinski, and Maria Borkowska

CONCENTRATION OF VARIOUS METALS IN THE AIR OF SOME POLISH TOWNS. *(Wystepowanie niektorych metali w powietrzu atmosferycznym wybranych miast polski). Text in Polish. Roczniki Panstwowego Zakladu Higi, 21(5):483-491, 1970. 20 refs.*

The average monthly and yearly concentrations of iron, manganese, copper, zinc, and chromium were determined in the atmospheric dust collected in Polish towns. Iron had an average concentration of 2.0-19.1 micrograms/cu m, manganese 0.07-0.79, copper 0.04-0.46, zinc 0.48-6.09, and chromium 0.002-0.057 microgram/cu m. The values were similar to those found for American, English, and German towns. The highest pollution levels in the air with the tested metals were found in Katowice, Zabrze, Cracow, and Wroclaw. The present level of these metals in the air of the investigated towns is in a range that does not constitute any serious risk from the standpoint of public health protection.

1968

33262 **APTIC NO. 57077**

Bouquiaux, J. and J. Grandjean

ATMOSPHERE POLLUTION, SMOKE AND SO2. *Bull. Mens. Inst. Royal Meteorol. Belgique, June 1968. Translated from French, 18p.*

Tables of the daily indications of sulfur dioxide and smoke pollution prepared from Belgium's air pollution network data are presented for the provinces of Brabant, Liege, Luxemburg, Namur, Hainaut, West Flanders, and Antwerp; graphs for daily variations of these pollution indications are illustrated for the communities of Liege, Charleroi, and Antwerp. The indications of pollution used are: strongly acidity of air expressed in micrograms of SO2/cu m of air and fume of fine dust expressed in micrograms/cu m air. The sampling apparatus consisted of a membranous electric pump, a Whatman paper filter no. 1, a scrubber containing 50 ml of oxygenated water, and a gas meter. Reflectometric analysis of the filter and acidmetric testing of the liquid from the scrubber provided the average proportion of fumes and SO2/cu m of air during the 24 hrs of sampling.

ATMOSPHERIC INTERACTION

1973

33263 **APTIC NO. 55664**

Attmannspacher, W. and R. Hartmannsgruber

ON THE VERTICAL OZONE AND WIND PROFILES NEAR THE TROPOPAUSE. *Pure Appl. Geophys. (Basel), vol. 106-108:1581-1585, 1973. 6 refs.*

The connection between the tropopause, the sharp increase in ozone at these altitudes, and the maximum of the horizontal wind was sought. Over a 5-year period, 294 ozonagrams were obtained and divided into three collectives: the ozone minimum below the tropopause; the ozone minimum and the tropopause at the same altitude; and the ozone minimum above the tropopause. The differences between the pressure heights of the wind maximum, the tropopause, and the ozone minumum were calculated. For the first two collectives, the wind maximum and the ozone minimum were at the same altitude and the wind maximum layer was situated below the tropopause. To find a possible connection between the height of the ozone minimum and the stage of development of the air pressure system, each ozone sounding of the air pressure system over southern Germany and its stage of development were determined. The ozone minimum was situated mainly below the tropopause (collective one) in the case of intensifying or stationary high pressure areas. It was at the same altitude (collective two) at the stage of intensifying or stationary low pressure areas and weakening high pressure areas. A few cases in which the ozone minimum was above the tropopause were also found, mainly in connection with intensifying low pressure areas. A change in the direction of the large-scale vertical motion may explain this ozone minimum and its connection to the wind maximum layer. The dynamic processes of the persistent wind maximum seem to govern the ozone minimum and the tropopause.

33264 **APTIC NO. 55722**

Attmannspacher, W. and R. Hartmannsgruber

ON EXTREMELY HIGH VALUES OF OZONE NEAR THE GROUND. *Pure Appl. Geophys. (Basel), vol. 106-108:1091-1096, 1973. 3 refs.*

Using a wet-chemical recording ozone meter, the ground ozone concentration was measured at Observatory Hohenpeissenberg, which is located near the top of an isolated mountain peak between Munich and the central Alps. On Feb. 26, 1971 a ground ozone concentration of 830 micrograms was recorded over a period of about 10 minutes. The first maximum, with values much higher than 150 micrograms/cu m was connected with a cold front crossing the station early in the morning bringing strong winds, heavy snowfall, and a decrease in temperature. The 830-microgram measurement was associated with the arrival of the main cold front, and an ozone concentration of over 500 micrograms/cu m was recorded in conjunction with another cold front and squall. Associated with the highest ozone value was an extremely high and very sharp secondary ozone maximum situated just above the tropopause at an altitude of about 10 to 11 km; the absolute minimum of the vertical ozone distribution was situated 1.7 km below the tropopause and 1 km below the wind maximum. The sharp secondary maximum seemed to be caused by the circulation of the jet stream, especially by its vertical motion and/or the circulation of cumulonimbus clouds. Sixteen cases of extremely high ground ozone values were recorded at the Observatory during 1971; there was no constant association with heavy snow or a strong air-electricity field. Thus, a final explanation for the ozone values greater than 500 micrograms/cu m cannot be given. Topography is mentioned.

33265 **APTIC NO. 55355**

Buchan, R. M., R. A. Mill, and C. H. Lawrence

ATMOSPHERIC DISPERSION OF PARTICULATE AIR POLLUTANTS EMITTED FROM AIR ACTIVATED SLUDGE UNIT. *J. Environ. Health, 35(4):342-345, Jan./Feb. 1973. 7 refs.*

The activated sludge unit for the treatment of sewage was studied as a source of particulate air pollutants with possible occupational and community health significance. The unit investigated generated tremendous numbers of protein and nonprotein particles within the respirable size range. These particles were not confined to the plant site, thus not only were plant employees in jeopardy of exposure, but residents in the vicinity of the plant site were also being exposed. A diffusion model was used to determine the distribution of the particles over the area.

33266 **APTIC NO. 55663**

Duetsch, H. U.

RECENT DEVELOPMENTS IN PHOTOCHEMISTRY OF ATMOSPHERIC OZONE. *Pure Appl. Geophys. (Basel), vol. 106-108:1361-1384, 1973. 33 refs.*

A review is presented of the increasingly rapid development of the photochemistry of odd oxygen particles which has taken place since the validity of the classical (oxygen only) theory was first questioned by Hampson and Hunt less than 10 years ago. The relative importance of different reactions are discussed related to altitude, and the nitrogen oxides induced alterations in the H-system are investigated. The fact that both the observed ozone and the nitric acid distribution should be explained considerably limits the acceptable values of poorly known rate constants. The influence of stratospheric pollution on the ozone concentration is discussed under the assumption of photochemical equilibrium. (Author summary)

33267 **APTIC NO. 55724**

Duetsch, H. U. and Ch. Ch. Ling

FOURTEEN-YEAR SERIES OF VERTICAL OZONE DISTRIBUTION OVER AROSA, SWITZERLAND, FROM UMKEHR MEASUREMENTS. *Pure Appl. Geophys. (Basel), vol. 106-108:1139-1150, 1973. 6 refs.*

Observations of the vertical ozone distribution over Arosa, Switzerland have been carried out almost continuously since 1956. Long-term trends in the ozone concentration at different levels are discussed in the light of data obtained from 5 years of parallel measurements with two Dobson spectrophotometers. Further substantiation of the suggested correlation between the ozone concentration in the upper stratosphere and solar activity (with a 2 to 3 year lag in ozone against sunspot numbers) is needed because no consistent agreement was obtained between the two instruments with respect to the secular variation at the top levels. Seasonal variations are mentioned. (Author summary modified)

33268 **APTIC NO. 55743**

Fabian, P. and P. G. Pruchniewicz

MERIDIONAL DISTRIBUTION OF TROPOSPHERIC OZONE FROM GROUND-BASED REGISTRATIONS BETWEEN NORWAY AND SOUTH AFRICA. *Pure Appl. Geophys. (Basel), vol. 106-108:1027-1035, 1973. 7 refs.*

By means of a meridional chain of 19 stations between Tromso, Norway and Hermanus, South Africa, a permanent registration of the ozone concentration near the ground was recorded since 1970. From the first year of operation, surprisingly systematic annual variations appeared which agreed with theoretical calculations on stratospheric-tropospheric exchange. While the short-term measurements gave different fluctuations for every station, certain probability patterns for the occurrence of the daily ozone maximum at ground level were noted. Typical continental stations usually showed the daily maximum around noon; stations located at the tops of isolated mountains exhibited high probability for the maximum occurring during the night; coastline stations generally showed a daily maximum during the evening and night; and stations such as Cagliari and Luanda showed a mixed type between continental and coastline behavior with a maxima occurring around noon as well as during the night. Nearly all stations exhibited a pronounced annual sine wave variation, with two stations in the southern tropical/subtropical latitudes showing something like semiannual waves. (Author abstract modified)

33269 **APTIC NO. 55665**

Figueira, M. F.

ATMOSPHERIC OZONE AND FLOW FIELD VARIATIONS OVER LISBON. *Pure Appl. Geophys. (Basel), vol. 106-108:1586-1599, 1973. 9 refs.*

The results of the observations of both the total and layered ozone content of the atmosphere, made in Lisbon during the period 1967 to 1971 are analyzed on a statistical basis in relation to the flow and temperature fields of the atmosphere, i.e., in relation to the position of the tropospheric jet axis and the 100 mb air temperature. The preliminary analytical results indicate that the yearly mean variation in total O3 follow the trend observed for other geographical coordinates, with a winter to spring maximum. In addition, the same parameter is positively correlated with the 100 mb temperature field for the seasons of the year, and that the total amount of O3 is significantly higher a few hundred km to the left of the jets looking downstream than to the right, so that the mean cross-flow gradients of O3 are field features to be taken into account. The time-height distributions of O3 revealed a descent of the level of the maximum depth (around 20 mb) from the summer-winter period to the spring. However, this descent may be much more pronounced on occasions, as revealed by the preliminary analysis over a period of a few days of important O3 changes in relation to the potential temperature and jet axis position. This showed, in addition, the existence of varying gradients along the stream, whereby differences in circulation along the jet complex may be implied. (Author abstract modified)

33270 **APTIC NO. 55327**

Fujii, Makoto and Masayoshi Tsuneoka

PREDICTION OF AIR POLLUTION. *(Taidi osen yosoku). Text in Japanese. Toshiba Rebyu (Toshiba Rev.), 28(7):740-744, July 1973. 8 refs.*

The movements of pollutants are determined by meteorological and geographical conditions. It is necessary to express the pollutant movement structurally and to quantitatively predict the meteorological factors governing the pollutant movements. Considering the emission rates, movements of pollutants, meteorological factors, and geographical conditions it is possible to make a prediction for an optional period of time. The predictive techniques include those for long and short periods, with priority being given to the estimation of the average concentration and state change, respectively. The development of prediction models through system methods is important.

33271 **APTIC NO. 55325**

Fukuoka, Yoshitaka

STATISTICAL METEOROLOGICAL STUDY ON PERIODICITY OF SO2- CONCENTRATION. *(SO2 nodo no shukisei ni kansuru tokei kishogakuteki kenkyu). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 284, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 35.)*

General and special cycles of sulfur dioxide concentration patterns were studied statistically, using the measurement and meteorological data of Chiba and Fukushima Prefectures. The daily fluctuation pattern in winter of Ichihara city, weekly patterns of several cities in Fukushima, and annual patterns in Konahama, Fukushima, and Ichihara in Chiba, are presented in graphs. Several cyclical patterns in Ichihara show heavy concentrations at 6 am, 10 am, 10 pm, and a 20-day cycle and a 6-month cycle. In Konahama, special cycles are 5-7 hours, 12 hours in summer, 21-23 hours in winter, and cycles of various lengths. Correlations of SO2 concentration and weather factors in Fukushima, such as SO2 and daily atmospheric pressure, and SO2 and mobile high pressure, are presented in graphs.

33272 **APTIC NO. 55772**

Fumarola, Giuseppe

STUDY OF THE AIR POLLUTANT DISPERSION PHENOMENON. APPLICATION TO THE DESIGN AND CONTROL OF INDUSTRIAL EMISSION SOURCES. *(Studio del fenomeno di dispersione degli inquinanti atmosferici. Applicazione ai problemi di progetto e controllo di sistemi emittenti industriali). Text in Italian. Quad. Ing. Chim. Ital., 1973: 83-88, May 1973. 39 refs.*

Premises on which all studies of the dispersion of atmospheric pollutants are based and the correlations linking emissions with pollution were examined. All pollutants emitted into the atmosphere disperse with time due to wind or diffusion. Air temperature causes turbulence of a thermal type and essentially vertical dispersion. In addition, molecular dispersion occurs which assumes significant values only under conditions of long-lasting atmospheric stability. Dispersion depends on a number of plant-related factors like height and diameter of stack and the kinetic and thermal content of the effluents. The problem of dispersion has been approached from the point of view of the statistical theory and of mass transfer. The problem is compounded by the frequent existence of multiple sources with dispersion assessment reliability decreasing with increasing number of emission sources. In the case of atmospheric inversions, ground level concentration increases with the reduction of wind velocity and with increasing duration of the inversion and decrease of its altitude. In spite of the many mathematical equations developed for the correlation between emissions and pollution, correct assessment of pollution levels resulting from discharge from one or from multiple sources is not always possible. The reason for this is that the theories on which such assessment is based are often in direct contradiction with the reality of physical phenomena in the lower atmosphere. Physical diffusion models arrived at by means of dimensional analysis seem to be most promising.

33273 **APTIC NO. 55641**

Funabashi, Nobuhisa

A REAL TIME AIR POLLUTION PREDICTION BY A MULTI-BOX MODEL. *(Taju bokkusu modeku ni yoru riaru time taiki osen yosoku). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 299, 1973. 2 refs. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 50.)*

A simulation model of sulfur dioxide dispersion was developed and discussed previously; using this model, a real time air pollution prediction method is presented by mathematical formulas and a diagram. The information necessary for input are the initial condition time, a specific box emission intensity, the function of wind vector, and the coefficients of pollutant dispersion from the box to another point. The precision of a forecasting is very much dependent on the accuracy of these variables. For correcting the errors of the initial conditions, the real time filtering method is applied to continuously supplied on-site data.

33274 **APTIC NO. 55382**

Grassl, Hartmut

AEROSOL INFLUENCE ON RADIATIVE COOLING. *Tellus (Uppsala), 4(25):386-395, 1973. 17 refs.*

Calculations of the longwave flux divergence within the atmosphere at different heights are presented including water vapor and aerosol particles as emitters and absorbers. The spectral region covered is 5 to 1 micron divided into 23 spectral intervals. The relevant properties of the aerosol particles, the single scattering albedo and the extinction coefficient, were first calculated by Mie-theory and later by an approximation formula with a complex index of refraction given by Volz. The particle growth with relative humidity is also incorporated for different aerosol types and size distributions. The results show a significant contribution of aerosol particles to longwave flux divergence, although strongly dependent on the imaginary part of the refractive index, the size distribution, and relative humidity. The aerosol contribution to radiative cooling becomes very important in layers below temperature inversions, which are barriers for particle diffusion. There exist atmospheric conditions where the aerosol contribution to radiative cooling is as large as cooling by water vapor. (Author abstract modified)

33275 **APTIC NO. 55693**

Guedalia, D., C. Allet, J. Fontan, A. Druilhet, and G. Assaf

LEAD-212, RADON AND VERTICAL MIXING IN THE LOWER ATMOSPHERE (100-2000) M. *Tellus (Uppsala), 4(25):381-385, 1973. 18 refs.*

Five vertical soundings of lead-212 concentrations were made in the lower atmosphere, in which Pb was measured together with radon three times, are summarized. The measurements were made in stable weather and under light winds conditions in southwest France. There was general agreement among Rn and Pb and the stability of the atmosphere which indicates a semisteady state situation. Using Rn and Pb profiles and an advection diffusion model, the mean vertical motion and the vertical diffusion were estimated. The results indicate downward wind of less than 1 cm/sec and vertical mixing which is very sensitive to stability. For the Brunt-Vaisala frequency sq N equals 3.5 times 10 to the -4th power/sq sec which is characteristic of isothermal atmosphere, K is approximately 1 sm m/sec. For a profile which is half adiabatic (sq N equals 1.7 times 10 to the -4th power/sq sec), K equals 10 sq m/sec; where sq N is smaller than 5 times 10 to the -5th power/sq sec, K is greater than 40 sq m/sec. These estimations were obtained on different days for levels of similar stabilities. (Author abstract modified)

33276 **APTIC NO. 55445**

Hilst, Glenn R., Coleman Dup. Donaldson, Milton Teske, Ross Contiliano, and Johnny Freiberg

THE DEVELOPMENT AND PRELIMINARY APPLICATION OF AN INVARIANT COUPLED DIFFUSION AND CHEMISTRY MODEL (FINAL REPORT). *Aeronatucial Research Associates of Princeton, Inc., Princeton, N. J., National Aeronautics and Space Administration Contract NASI-11433, 84p., Sept. 1973. 15 refs.*

NTIS: NASA CR-2295

An approximate closure scheme for a chemical kinetic submodel which conforms to the principles of invariant modeling and which accounts for the effects of inhomogeneous mixing over a wide range of conditions has been developed. This submodel has been coupled successfully with invariant turbulence and diffusion models, permitting calculation of two dimensional diffusion of two reacting (isothermally) chemical species. The initial calculations indicate the ozone reactions in the wake of stratospheric aircraft will be substantially affected by the rate of diffusion of ozone into the wake, and in the early wakd, by unmixedness. (Author abstract modified)

33277 **APTIC NO. 55315**

Hino, Mikio

PREDICTION OF AIR POLLUTION. *(Taiki osen nodo no yosoku). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, no. 19-35, 1973. 20 refs. (Presented at the Japan Society of Mechanical Engineers, Special Lecture Meeting on Environmental Pollution Control, Hiroshima, Japan, Oct. 19, 1973.)*

Various methods of predicting air pollution concentrations in the environment are reviewed. The methods are grouped largely in physical and non-physical systems. The physical systems include models based on figure calculations of various simulation models, simplified physical models based on plume behaviors, layer plume and puff behaviors, and simplified physical model control theories based on mixed layers and multiple boxes. The non-physical models discussed are the control theory based on the Kalman filter model, and statistical analyses based on regression analysis and factor analysis.

33278 **APTIC NO. 55649**

Itakura, T., M. Sawada, T. Tajima, S. Kubo, K. Fujisaki, M. Kitamura, C. Nakagawa, T. Taira, and F. Shoda

COMPUTATION OF GROUND LEVEL CONCENTRATION OF SULFUR DIOXIDE IN MONITORING POINTS IN THE KANAZAWA AREA. *(Kanazawa chiku taiki kenshikyoku secchiten ni okeru aryusan gasu nodo reberu no suitei). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 296, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 47.)*

The sulfur dioxide concentration levels at seven air pollution monitoring stations in Kanazawa were calculated by a dispersion formula and measurements at emission sources. The results were compared with actual measurements. The mathematical computation formula represents a long-term average concentration. The weather parameters were obtained from the Japan Atmospheric stability classification table, and the wind direction, wind velocity, and temperature data were obtained from monitoring stations and the Kanazawa weather bureau. The area covered was 250 sq km around the city of Kanazawa; emission sources were 468 stacks. The monthly calculations and actual measurements generally agreed except for a small part, and the formula could be regarded useful and dependable for both predictions and determination of new monitoring station locations.

33279 APTIC NO. 55643

Kawashima, Eikichi, Takeo Shoda, Masami Yoshino, Satoshi Yamahara, and Takatoshi Tajima

A CONSIDERATION OF ENVIRONMENTAL CAPACITY. (SELF-PURIFICATION SPEED OF SULFUR OXIDES). *(Kankyo yoryo ni tsuite no ichi kosatsu (io sankabutsu no jijo sokudo)). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 291, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 42.)*

Under normal environmental conditions, pollution concentration increases with a slow gradient as the emission quantity in the area increases; but once the natural purification capacity limits are exceeded, pollution increases drastically. Therefore, a mathematical formula for pollution characteristics in relation to natural capacity for purification can help obtain maximum allowable emission under various conditions. The self purification speed of a given area was obtained; weather and other factors and emission quantity are used for input to obtain parameters under given conditions. The formula can be also applied to a box model.

33280 APTIC NO. 55424

Khan, M. A. Q., W. F. Coello, and Z. A. Saleem

LEAD CONTENT OF SOILS ALONG CHICAGO S EISENHOWER AND LOOP- TERMINAL EXPRESSWAYS. *Arch. Environ. Contam. Toxicol., 1(3):209-223, Oct. 1973. 14 refs.*

The lead content of soils along Chicago s two expressways, the Chicago Loop-terminal Expressway and the Eisenhower Expressway, was determined in various seasons of the year and at various distances from the roadway. The concentration of lead in soils along the Chicago Loop-terminal Expressway and adjoining city streets show positive correlation (correlation coefficient equals 0.988) with the average traffic volume near the sampling sites during the same season. The levels of Pb in soils along the Eisenhower Expressway at the same site vary with the season, the Pb levels attain peak values during summer. The seasonal variation in the Pb levels is the least during fall and winter, increases during spring, and attains peak values during summer. The seasonal variation in the Pb levels is similar to the seasonal variation in average monthly traffic volume on the expressway. The soil contains as much as 7600 ppm of Pb (micrograms/g of dried soil) up to 45 ft and 900 ppm up to 150 ft from the Eisenhower Expressway. (Author abstract modified)

33281 APTIC NO. 55726

Mani, A., C. R. Screedharan, P. V. Joseph, and S. S. Sinha

STUDIES OF THE VERTICAL DISTRIBUTION OF ATMOSPHERIC OZONE IN ASSOCIATION WITH WESTERN DISTURBANCES OVER INDIA. *Pure Appl. Geophys. (Basel), vol. 106-108:1192-1199, 1973. 4 refs.*

A series of ozone soundings were made at New Delhi from January 21 to 30 and February 10 to 22, 1972 to study the changes in the vertical distribution of atmospheric ozone associated with western disturbances. The Indian ozonesonde was used. In Feb. 1972, two western disturbances moved eastward in quick succession across the western Himalayas, the first between the 11th and 13th and the second between the 13th and 15th of the month. Associated with the first tropospheric trough was a high-speed jet stream with wind speeds reaching 180 knots (wnen the tropopause descended to 304 mb over Dehli). The second trough had no high-speed jet associated with it and the tropopause was at 227 mb. Ozone maxima were observed at 350, 180, and 125 mb, in addition to the main peak at 35 mb which was associated with the upper tropospheric troughs over Delhi and its environs. A similar lowering of the tropopause and the influx of ozone in shallow layers was observed during the passage of the two upper air troughs in Jan. 1969. Thus, with the approach of upper tropospheric troughs and the simultaneous lowering of the tropopause, there is an increased influx in shallow layers of middle latitude ozone-rich air through breaks in the tropopause, replacing the subtropical ozone-poor air over the station. (Author abstract)

33282 APTIC NO. 55727

Mani, A. and C. R. Sreedharan

STUDIES OF VARIATIONS IN THE VERTICAL OZONE PROFILES OVER INDIA. *Pure Appl. Geophys. (Basel), vol. 106-108:1180-1191, 1973. 11 refs.*

The latitudinal and temporal variations in the vertical ozone profiles over the Indian subcontinent are discussed. In the equatorial atmosphere represented by Trivandrum and Poona, while the tropospheric ozone showed marked seasonal variations, the basic pattern of the vertical distribution of ozone in the stratosphere remained practically unchanged throughout the year, with a maximum at about 28 to 26 km and a minimum just below the tropopause. The maximum total ozone occurred over Trivandrum in the summer monsoon season and the latitudinal anomaly observed over the Indian monsoon area at this time arises from the horizontal transport of ozone-rich stratospheric air from over the thermal equator to the southern regions. In the higher latitudes represented by New Delhi, the maximum occurs at 23 km. Delhi, which lies in the temperate regime in winter, showed marked day-to-day variations in association with western disturbances and the strong westerly jet stream that lies over north and central India at this time. Although the basic pattern of the vertical ozone distribution in the equatorial atmosphere is generally the same in all seasons, significant though small changes occurred in the lower stratosphere and in the troposphere. There were small perturbations in the ozone and temperature structures, distinct ozone maxima always being associated with temperature inversions. There were also large perturbances not related to temperature, ozone-depleted regions normally reflecting a stratification of either destructive processes or materials such as dust layers or clouds at these levels. Particularly interesting were the upper tropospheric levels just below the tropopause where the ozone concentration is consistently the smallest in all seasons and at all locations where soundings have been made in India. (Author abstract)

33283 APTIC NO. 55698

Merritt, Gordon and George Rudinger

THERMAL AND MOMENTUM DIFFUSIVITY MEASUREMENTS IN A TURBULENT STRATIFIED FLOW. *AIAA (Am. Inst. Aeron. Astronaut.) J., 11(11): 1465-1470, Nov. 1973. 19 refs. (Presented at the AIAA Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17, 19, 1972, Paper 72-80.)*

The effect of stratification on mixing coefficients was examined using measurements of velocity and temperature across the interface between a layer of warm water flowing over a pool of colder water in a channel. Velocity profiles were obtained by generating local changes in pH to produce colored tracers that are neutrally buoyant at all points in the stratified flow. Temperature profiles were measured with small thermistor beads that reverse the water regularly at selected locations. The measurements of velocity and temperature and their gradients combined with the conservation equations of mass, momentum, and energy yield the transfer coefficients for heat and momentum. Parameters characterizing the functional relationships between these eddy diffusivities and the Richardson number are determined and agree well with environmental data and analytical predictions. The water channel measurements confirm that the vertical thermal diffusivity profile can be expressed in terms of a Richardson number defined by surface conditions, depth, and temperature gradient as assumed for the prediction of the thermal structure in a large temperate lake. A semiempirical parameter required in the expression relating thermal diffusivity to Richardson number has been determined for the measurements. The effect of stratification of mixing flow is important in air pollution by smokestacks and thermal pollution of water. (Author abstract modified)

33284 APTIC NO. 55460

Mirabel, Philippe and Joseph L. Katz

BINARY HOMOGENEOUS NUCLEATION AS A MECHANISM FOR THE FORMATION OF AEROSOLS. *Preprint, Clarkson Coll. of Technology, Potsdam, N. Y., Dept. of Chemical Engineering and Clarkson Coll. of Technology, Potsdam, N. Y., Inst. of Colloid and Surface Science, 26p., 1973. 22 refs.*

The rates of nucleation of liquid aerosols from gaseous mixtures of sulfuric acid and water and nitric acid and water at 25 C were calculated for various relative humidities (10-100%) and various activities of acid vapor using the Flood-Neumann-Doring-Reiss- Doyle theory of binary homogeneous nucleation. The activities of acid vapor needed for nucleation of the sulfuric acid mixture were 25-300 times smaller than for the nitric acid mixture due to the much larger free energy of mixing in the liquid phase for the former. Conversion from activities to actual pressures led to concentrations of nitric acid which were much too high to be found under normal atmospheric conditions. Concentrations of sulfuric acid vapor needed to nucleate droplets in the H2SO4-H2O system were in the range of .00004 to .013, a concentration range which could result from photooxidation of sulfur dioxide in the atmosphere. Calculations were made of the growth curves for sulfuric acid plus water droplets (radius versus composition) at various relative humidities from the critical size radius up to a 1000 A radius, corresponding to nuclei large enough to serve as condensation centers for heterogeneous nucleation; and a generalized version of the Kelvin equation which included the composition dependence of the surface tension for a binary mixture was derived and applied in calculating the growth curves. Sign errors in the second derivatives of the free energy in Doyle s paper were corrected. Limitations of binary homogeneous nucleation theory at extremely low concentrations of one of the components are discussed, and the theory is inapplicable if the actual vapor pressure of one component is below 10 to the minus 6 torr. (Author abstract modified)

33285 APTIC NO. 55719

Mukherjee, B. K. and Bh. V. Ramana Murty

HIGH-LEVEL WARMINGS AND TOTAL OZONE OVER A TROPICAL REGION. *Pure Appl. Geophys. (Basel), vol. 106-108:1018-1026, 1973. 11 refs.*

The stratospheric rocketsonde data obtained from the launchings made at Thumba during the winter of 1970-71 indicated that warmings of noticeable magnitude occurred at high levels (upper stratosphere and mesosphere) over this tropical station at that time. The mean monthly radiosonde temperatures of 50, 100, and 300 mb levels at Thumba (Trivandrum) and Delhi during the same period also indicated certain anomalies consistent with the warmings at Thumba. The radiosonde temperatures at Thumba and Delhi were examined along with the total ozone values for 10 winter periods beginning in 1961-62. The analysis indicated that high-level warmings may have occurred in the past over the Indian region during the winters of 1963-64 and 1967-68; prominent warmings definitely occurred during these periods at higher latitudes. The behavior of total ozone was different in the different years of the warmings. The features noticed are presented and discussed. (Author abstract)

33286 APTIC NO. 55324

Naito, Masaaki and Suehiro Otoma

PROPOSAL OF THE TRANSFER MATRIX AND ITS APPLICATION. *(Osen denpa tatorikusu no teian to sono riyo). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 300, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 51.)*

A long-term, average-concentration, sour-receptor matrix is proposed based on a regular plume model. The matrix shows the relationship between the intensity of pollutant concentration at each of a multiple number of urban emission sources and the pollutant concentration at each receptor. Once the matrix is obtained, various calculations of long term concentration can be applied. Usually, a normal plume model is C equals Aq. The letter C stands for pollution concentration, q is emission intensity, and A is a function involving many factors. In this formula, coordinates of emission sources and receptors, and effective stack heights and air stability are used. Optimum attenuation of emission intensity was calculated.

33287 APTIC NO. 55322

Nishida, Kaoru, Yutaka Itakura, Takeo Yamamoto, and Tomonori Ohashi

PREDICTION OF AUTOMOBILE EXHAUST GAS CONCENTRATION IN THE VICINITY OF STREETS CONSIDERING FROM WIND TUNNEL EXPERIMENTS. *(Fudo jikken kara mita gairo shuhen ni okeru jidosha haishutsu gasu no nodo yosoku ni tsuite). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 294, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 45.)*

A prediction method for the automotive exhaust concentration in a road space surrounded by buildings was devised, and the relationships among traffic amount, wind direction, wind velocity, buildings, and automotive emissions on a common public road are discussed. A simulation model was installed in a wind tunnel of with a diameter of 2.4 m and 5.4 m length. A rotation disk in the tunnel was used to change the wind velocity and wind direction. Ethane gas was used as the tracer gas at the velocity of 1-8 m/sec. The gas concentration, wind velocity, measurement height, pollution emission quantity by unit length and unit time, building height, and road width were used to formulate an equation for the air quality prediction. The formula was confined by actual measurements in Osaka which were effective for the calculation of emission concentrations in a relatively simple public road.

33288 APTIC NO. 55642

Ootaki, Atsushi, Kiyoshige Shiozawa, Shinichi Okamoto, Junichi Yamane, and Jun Hiroo

STUDIES ON THE PREDICTION OF AIR POLLUTANT CONCENTRATION (VI). A TIME CHANGE PREDICTION MODEL. *(Taiki osen nodo no yosoku ni kansuru kenkyu (VI), jikeiretsu yosoku moderu). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 301, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 52.)*

The fluctuation of weather may be considered as a composite fluctuation of factors made of a number of cycles, and pollutant concentration changes can be regarded as the result of these cyclic variations. How the concentration fluctuates by meteorological cyclical factors was examined using a regular multi-regression formula in order to arrive at a forecast formula. With this method, the weather patterns of 256 days between January and September, 1969 in Tokyo were analyzed. The data of the Tokyo Weather Observatory on the sea air pressure, temperature, vapor pressure, humidity, wind velocity, weather, clouds, visibility, dew point temperature, and sunshine for this period were used. Within the unit of one day, assuming that measurements were taken 24 times, the data were analyzed by 256 cyclic variations. With 24 sets of data expressing each cyclical variations, 128 multi-regression formulas were constructed. Approximately 80% of pollution cyclical variations could be explained by the cyclical variations of weather factors. Delicate fluctuations of pollutant concentration are influenced by minute changes of weather factors.

33289 **APTIC NO. 55688**

Prabhakara, C., E. B. Rodgers, and V. V. Salomonson

REMOTE SENSING OF THE GLOBAL DISTRIBUTION OF TOTAL OZONE AND THE INFRARED UPPER-TROPOSPHERIC CIRCULATION FROM NIMBUS IRIS EXPERIMENTS. *Appl. Geophys. (Basel), vol. 106-108:1226-1237, 1973. 13 refs.*

The global distribution of total ozone was derived for the period May through July 1969 from Nimbus-3 Infrared Interferometer Spectrometer (IRIS) experiments. Preliminary estimates of ozone concentrations from Nimbus-4 IRIS for the same period in 1970 show similar results. The standard error of estimation of total ozone from both IRIS experiments is about 6% with respect to Dobson Spectrophotometer measurements. A systematic variation in the ozone distribution from April through July in the tropical, middle, and polar latitudes was observed, indicating the changes in the lower stratospheric circulation. The total ozone measurements show a strong correlation with the upper tropospheric geopotential height in the extratropical latitudes. From this relationship, total ozone was used as a quasi-stream function to deduce geotrophic winds at the 200 mb level over extratropical regions of the northern and southern hemispheres. These winds reveal the subtropical and polar jet streams over the globe. (Author abstract)

33290 **APTIC NO. 55710**

Pruchniewicz, P. G.

THE AVERAGE TROPOSPHERIC OZONE CONTENT AND ITS VARIATION WITH SEASON AND LATITUDE AS A RESULT OF THE GLOBAL OZONE CIRCULATION. *Pure Appl. Geophys. (Basel), vol. 106-108:1073, 1973. 33 refs.*

Evaluations of radiosonde soundings over North America and Europe, measurements aboard commercial airlines, and permanent ozone registrations at 19 ground-based stations between Tromso, Norway and Hermanus, South Africa indicate three belts of higher ozone intrusion from the stratosphere and maximum values of the annual means at about 30 deg N, between 40 and 45 deg N, and at about 60 deg N. A marked decrease in the annual mean values of the tropospheric ozone is detected towards the equator and the pole, respectively. In the northern hemisphere, the maximum of the annual cycle of the tropospheric ozone concentration occurs in spring at high latitudes and in summer at mid-latitudes. For the tropical regions between 30 deg S and 30 deg N, a strong asymmetry of the northern and southern hemispheres occurs. The higher troposphere of the tropics seems to be a well-mixed reservoir and primarily supplied with ozone for the tropopause gap region in the northern hemisphere. The ozone distribution in the lower troposphere of the whole tropics seems to be controlled by the up and down movements of the Hadley cell. The features of large-scale and seasonal variations in tropospheric ozone are discussed in relation to the ozone circulation in the stratosphere, the dynamic processes near the tropopause, and the destruction rate at the earth s surface. (Author abstract modified)

33291 **APTIC NO. 55416**

Sato Kimiyoshi, Junichiro Takeuchi, Kazumi Koike, and Ichiro Kojima

PHOTOCHEMICAL SMOG FORECASTING PROGRAM. *(Taiki osen yosoku shisutemu). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 293, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 44.)*

Presently available data on photochemical smog forecasting information were programmed into the air pollution monitoring system of Aichi Prefecture. In Aichi, data are sent in every 20 min from 51 monitoring stations (oxidant measurements by 27 stations, meteorological monitoring at 41 stations), and every hour from 16 stations (oxidant measurements by 7 stations, meteorological monitoring by 12 stations) by real-time electronic computer. Potential high oxidant (more than 0.1 ppm) forecasts are issued when certain types of atmospheric pressure locations, upper altitude activities, temperatures, wind directions and velocities, and weather in general appear. This new programming obtains a quick and accurate forecast for potentially high oxidant concentration and photochemical smog.

33292 **APTIC NO. 55656**

Schaefer, Helmut and K. Philippi

THE ENERGY CYCLE OF THE EARTH. *(Der Energiehaushalt der Erde). Text in German. Brennstoff-Waerme-Kraft, 25(9):361-365, Sept. 1973. 9 refs.*

In discussions concerning thermal pollution of the atmosphere, a global interference with the natural energy cycle of the earth is often discussed. However, the heat liberated by human activities and discharged into the atmosphere will not influence the global energy cycle neither today nor in the near future. The solar radiation reaching the earth s surface of about 2.9 times 10 to the 24th power J/yr is more than 99.9% of the total energy household on the earth. The total annual primary energy use amounts to 0.007% which corresponds to the quantity of energy transmitted from the sun to the earth in 37 min. Only a very small fraction of the solar energy is converted by photosynthesis into chemically bound energy. Moreover, through respiration of the plants, about 55% of the energy bound by photosynthesis is liberated again as heat. To this must be added 25% from respiration by humus. The annual gain of chemically bound energy is about 1.2 times 10 to the 21st power J, and corresponds to six times the present use of primary energy. Thermal pollution therefore will not be a global problem, although it will continue to be a serious regional problem.

33293 **APTIC NO. 55318**

Shiozawa, Kiyoshige, Atsushi Otaki, Shinichi Okamoto, Junichi Yamane, and Jun Hiroo

STUDIES ON THE PREDICTION OF AIR POLLUTANT CONCENTRATION (VII).-- SIMULATION OF URBAN POLLUTION BY DIFFUSION MODELS. *(Taiki osen nodo yosoku ni kansuru kenkyu (VII) - Sanshiki moderu ni yoru toshi osen no shimureshon -). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 302, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 53.)*

The regular plume behavior diffusion formula or the puff model formula cannot be applied to the computer. The puff model formula was modified for the computer, and it is applicable even when wind direction and velocity change of a certain extent. Calculations for the crosswind and downwind distance are added to the regular plume axis model. The smoke concentration distribution up to 6 hr prior to the calculation time is mathematically formulated.

33294 **APTIC NO. 55321**

Shoda, T., Y. Izumi, H. Yoshida, Y. Nakajima, and S. Yamahara

A CONSIDERATION ON THE CONTROL FOR QUANTITY OF AIR POLLUTANTS. *(Soryo kisei no tame no ichi-kosatsu). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 292, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 43.)*

For the city of Kanazawa, maximum allowable emission quantities for various districts were calculated by using a diffusion formula and pollutant load model. In the 130 sq km of the Kanazawa area, there are 416 plants; the area was divided into 1 sq km mesh and all the emission sources in each segment were considered as one source. The stack height and emission quantity were multiplied, and pollution loads for neighboring segments were calculated by diffusion formula. Then, the total area was divided into four boxes and the allowable emission quantity for each box for maintaining the environmental standard was calculated. Measurement data for each box was obtained from the actual electroconductivity monitoring data. The pollution factors and reduction rate of each box were obtained.

33295 **APTIC NO. 55725**

Simmons, E. L. and R. A. Hamilton

OZONE AS A STRATOSPHERIC LAGRANGIAN TRACER. *Pure Appl. Geophys. (Basel), vol. 106-108:1200-1207, 1973. 12 refs.*

Published papers reporting the use of ozone as a tracer are reviewed with the conclusion that the results are limited by a lack of data. The results of a Meteorological Office experiment in which soundings were made at 12-hour intervals from four stations are also reported. In light of the results, it appears that little further progress is likely unless measurements involving sixty stations and soundings every 3 hours can be launched. This would be a formidable undertaking, which raises the question of whether it would be worth the effort and expense. A more modest approach might involve the use of both aircraft and balloons. (Author abstract)

33296 **APTIC NO. 55662**

Spaenkuch, D., W. Doehler, and H. Kubasch

STATISTICAL CHARACTERISTICS OF THE VERTICAL OZONE DISTRIBUTION IN MID-LATITUDES. *Pure Appl. Geophys. (Basel), vol. 106-108: 1108-1118, 1973. 26 refs.*

Using the correlation matrix for the vertical ozone distribution and the temperature-ozone cross correlation matrix, which were calculated from ozone soundings made over Berlin between 1967 and 1970, the statistical structure of the vertical ozone profile (correlation coefficients, average profiles, average standard deviation, relative variability) was derived for the three ozone seasons. The partial ozone pressure does not follow a normal distribution (e.g., at tropopause level) at all heights. Generally, the correlation between tropospheric and stratospheric ozone is rather poor. In some layers, the highest correlation coefficients (-0.3 and +0.4) occur in autumn, winter and spring. The correlation between the ozone concentrations of various stratospheric layers is distinct in autumn, less distinct in summer, and entirely absent from January to April. Conspicuous cross-correlations between temperature and ozone were found for all three seasons with a negative correlation between tropospheric temperature and middle tropospheric to middle stratospheric ozone, with a rather strong positive correlation between the ozone content and the temperature in the lower stratosphere, and with a positive correlation between the ozone content of the middle stratosphere and the temperature of the middle stratosphere. The highest correlation coefficients occur in autumn. (Author summary modified)

33297 **APTIC NO. 55721**

Sreedharan, C. R. and V. S. Tiwari

SHORT-TERM GROUND OZONE FLUCTUATIONS AT POONA. *Pure Appl. Geophys. (Basel), vol. 106-108:1097-1105, 1973. 7 refs.*

Short-term fluctuations superimposed on the diurnal variations in surface ozone recorded at Poona between 1969 and 1970 are discussed. While there is a net production of ozone during the discharge of electricity in a thunder cloud, the surface ozone recorder often registered a decrease in the surface ozone concentrations. This decrease coincided with updraughts generated during the formation of a thunderstorm. Similar sharp increases in ozone were observed with downdraughts. When lightning occurred without the development of a thunderstorm over the station, an increase in ozone density was observed just after the first lightning discharge. Apart from the fluctuations associated with thunderstorms in summer, short fluctuations in density were observed during the winter and in the morning. Abrupt falls in ozone occurred with the formation of a stable layer near the ground at night and with a sudden surge after the breaking up of the layers in the morning. The changes in ozone were, however, much more pronounced than those in temperature and wind. The striking correlation between surface ozone, surface air temperature, and wind provides a unique tool for the study of low-level temperature inversions. (Author abstract)

33298 **APTIC NO. 55675**

Sullivan, Robert L. and David F. Hackett

AIR QUALITY CONTROL USING A MINIMUM POLLUTION-DISPATCHING ALGORITHM. *Environ. Sci. Technol., 7(11):1019-1022, Nov. 1973. 5 refs.*

A technique for dispatching fossil fueled electric generators to reduce ground level sulfur dioxide concentrations is summarized. Highlights of the mathematical technique for determining the minimum pollution dispatching (MPD) schedules are presented. A nonlinear minimization technique, analogous to that used to solve the economic load dispatching problem (ELD) was used to minimize the environmental cost function. To compute the MPD schedules for the generators of a sample system, the equations were programmed on a digital computer. The program was divided into four basic parts: input mathematical computation, load shedding, and output. The dispatching schedules and ground level SO2 concentration were determined for a sample, but realistic problems are presented to illustrate the effectiveness of the proposed technique. The results of the sample problem clearly demonstrate the viability of dispatching generators using an environmental cost to ensure compliance with ambient air quality regulations. An accurate deterministic dispersion model must be used if useful results are to be obtained. (Author abstract modified)

33299 **APTIC NO. 55585**

Suzuki, Shin

THE RECENT ASPECTS OF PHOTOCHEMICAL SMOG. (I). *(Saikin no kokagaku sumoggu ni tsuite). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 25(8):56-75, Aug. 1973. 8 refs.*

Photochemical smog in Japan is discussed, including reaction mechanisms, governmental regulations, measurement methods, meteorological factors, pollution sources and their relation to smog, and the present status of photochemical pollution. Los Angeles and Japanese smog are compared.

33300 **APTIC NO. 55431**

Tadmor, J. and A. Manes

PHOTOCHEMICAL SMOG POTENTIAL OF URBAN AREAS IN ISRAEL. *Israel J. Earth-Sci., 22(2):93-105, 1973. 41 refs.*

The photochemical smog potential of the urban areas in Israel was evaluated on the basis of an examination of the general conditions leading to this type of air pollution and a comparison of conditions prevailing in Israel with those in the Los Angeles area. The presence of nitrogen oxides and hydrocarbons, and meteorological conditions which diminish dispersion (mainly a shallow mixing depth and light winds), together with clear sky and intense solar radiation, necessary for the initiation of photochemical reactions, are the main conditions favoring the formation of photochemical smog. None of these conditions are present in Israel, although they may occur throughout the year, most frequently in summer. Taking into consideration the stead increase of the combustion of petroleum products in Israel, it is concluded that there is a high photochemical smog potential, especially in the main urban areas. (Author abstract modified

33301 **APTIC NO. 55314**

Takamatsu, Takeichiro

UNCERTAINTY IN ENVIRONMENTAL CONTROL AND ITS SOLUTION. *(Kankyo seigyo ni okeru fukatsuteisei no sonzai to sono shori). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, p. 8-18, 1973. (Presented at the Japan Society of Mechanical Engineers, Special Lecture Meeting on Environmental Pollution Control, Hiroshima, Japan, Oct. 19, 1973.)*

In order to synthesize an effective environmental pollution control system, uncertain factors must be studied and clarified from the application-oriented standpoint. The uncertainty of system boundaries, condition parameters, and meteorological factors is discussed. The internal condition parameters are selectively examined and differential formulas are derived. Pollution concentration, mixed dispersion coefficient, wind velocity, absorption and adsorption factors, pollution concentration fluctuation speeds, locations, and time are taken into consideration in formulating models. A method of an optimum observation (monitoring) network by cluster analyses is briefly discussed.

33302 **APTIC NO. 55666**

Tanaevsky, O.

COMPARATIVE STUDY OF THE GROUND-LEVEL NITROGEN DIOXIDE AND OZONE CONCENTRATIONS. INFLUENCE OF METEOROLOGICAL CONDITIONS. *(Etude comparee du peroxide d azote et de l ozone au niveau du sol. Influence des conditions meteorologiques). Text in French. Meteorologie, no. 17:23-28, Jan.-March 1973. 2 refs.*

Meteorological data used were recorded northwest of Quai Saint Bernard by the Edgar-Paneth method. Monthly values of nitrogen dioxide and ozone were compared for 1969 and 1970. Nitrogen dioxide concentrations were examined for the different seasons as a function of wind direction. Wind intensity, temperature, pressure, rainfall, visibility and other weather conditions were also examined. Generally, a lowering of temperature increases pollution, and rainfall diminishes it. Pressure, visibility, and general meteorological conditions do not greatly affect pollution concentrations. Strong winds diminish pollution. Effects of wind direction vary seasonally.

33303 **APTIC NO. 55720**

Tiefenau, H. K., P. G. Pruchniewicz, and P. Fabian

MERIDIONAL DISTRIBUTION OF TROPOSPHERIC OZONE FROM MEASUREMENTS ABOARD COMMERCIAL AIRLINERS. *Pure Appl. Geophys. (Basel), vol. 106-108:1036-1040, 1973. 2 refs.*

Twenty registrations of the ozone concentration of the upper troposphere were carried out aboard commercial airliner between Europe and South Africa within a period of 14 months. Nearly each of these meridional ozone profiles shows an approximately constant ozone content between 25 deg S and 25 deg N with a pronounced seasonal variation. Most of these profiles show two marked peaks in the ozone concentration at about 30 deg N and between 40 and 45 deg N. Though the number of these registrations is insufficient for statistical computations, the first results confirm the meridional ozone distribution which was expected from studies using ozone-radiosonde soundings. Moreover, a strong asymmetry between the northern and southern hemispheres was confirmed by these ozone measurements. (Author abstract)

33304 **APTIC NO. 55319**

Tsukatani, Tsuneo and Hikaru Shoji

PERCENTILE CONCENTRATION AND AIR QUALITY STANDARDS. *(Pasentairu nodo to kankyo kijun). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 288, 1973. 3 refs. (Presented at the Japan Society of Air Pollution., Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 39.)*

Air pollutant distribution patterns were examined by mathematical models of a logarithmic regular distribution, a biquadratic root regular distribution, a gamma distribution, and Wyble (Weible?) distribution models. Actual measurements agreed with the theoretical values. Maximum air pollutant concentration behavior was derived from the percentile theory and agreed with actual measurements.

33305 **APTIC NO. 55331**

Tsuruta, Haruo

ATTENUATION OF SOLAR UV RADIATION BY LOWER ATMOSPHERE. *(Kaso taiki ni yoru taiyo shigaisen no gensui). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 303, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 54.)*

Solar radiation plays an important role in the complex photochemical reaction of air pollutants. Attempts were made to measure exactly how much solar energy is attenuated by the time it reaches the earth, and by what material, and how it is reduced. A sun follower which follows the image of the sun received by a solar battery was used. The solar ray ultraviolet energy of 3000 A-5000 A wavelength is attenuated by the Rayleigh dispersion in the air, absorbed by ozone, dispersed by aerosol, and absorbed by nitrogen dioxide and sulfur dioxide. For less than 3100 A wavelength, the effect of ozone is the strongest, and for more than 4000 A wavelength, attenuation by aerosol is the greatest. Nitrogen dioxide reduces solar energy approximately 10% at most. The apparatus consisted of a sun follower, a filtered phototube, an amplifier, AD converter, paper tape (recorder), and computer. Experiments are still being conducted using various interference filters.

33306 **APTIC NO. 55648**

Yasuoka, Takashi and Shunmei Mitsuzawa

THE EFFECTS OF TEMPERATURE AND HUMIDITY ON NITROGEN OXIDES. *(Chisso sankabutsu ni taisuru ondo to shitsudo no eikyo). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 304, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 55.)*

The degree of adsorption of nitric oxide and nitrogen dioxide in the air by the earth and that of separation therefrom, very much depend on the temperature and humidity in the environment. Experiments with NO, soil, temperature, and humidity were conducted in acrylic resin gas chambers. Five to 10 kg of soil was placed in the chamber. Nitric oxide and NO2 concentrations in the chambers were continuously measured by a nitrogen oxide automatic meter. When 10 ppm of NO was left in a chamber with 10 kg of soil for 5 hr, NO was absorbed and the concentration in the air dropped to 1 ppm. When the soil was heated, at 60 C, NO began to free, and at 110 C, the entire amount of NO was separated from the soil. In this case, NO was not freed, but when humidity was added at the same time as heating the soil, both NO and NO2 were freed from the soil. Dry soil was left in gas chambers with 50, 37, 25, and 13 ppm of NO for 5 hr, and then the amount of NO freeing from the soil was measured. The amount of NO (concentration) freeing from the soil paralleled the original concentration of NO gas in the chamber. When the dry soil having adsorbed NO was dampened, the speed of freeing NO was slowed down. Temperature and humidity on the earth very much influence the role of earth as nitrogen oxide storage, and this fact and the degree of temperature and humidity might be important factors in creating oxidants in the atmosphere.

1972

33307 **APTIC NO. 57036**

AIR POLLUTION-COMPLEMENTARY STUDY: DISPERSION AND DIFFUSION OF EFFLUENTS EXPELLED BY THE CONEMAUGH THERMAL POWER STATION IN THE JOHNSTOWN REGION (PENNSYLVANIA, USA). *(Pollution atmospherique-- etude complementaire: dispersion et diffusion des effluents rejetes par la centrale thermique de Conemaugh dans la region de Johnstown (Pennsylvania, USA)). 1972. Translated from French, 35p.*

A study based on on-site measurements of effluent dispersion from the Conemaugh thermal power station taken during 1970 and on hydraulic simulation of the conditions is presented as a supplement to the original atmospheric pollution study, Dispersion and Diffusion of Effluents Expelled by the Thermal Power Stations of Conemaugh and Seward in the Region of Johnstown, Pennsylvania. October 1971. The study is divided into four parts: diffusion of plume from the Conemaugh thermal power station according to 1970 measurements and comparison with the Sutton theory and a colorimetric experiment using a hydraulic jet; comments on the diffusion conditions of effluents from the thermal power station on Oct. 20, 28, and 29 of 1970; distribution of the ground concentrations of SO2 in a neutral atmosphere for a wind coming from 140 degrees; and comparison of SO2 measurements on the ground using bubblers with results of colorimetric tests with hydraulic jets. The four parts are compiled to show the capabilities of the colorimetric method with hydraulic simulation on a site with an accidented relief and clearly show the overriding influence of the relief on the behavior of plumes of effluents and on the diffusion of pollutants. The colorimetric method obtains, with good approximation, the distribution of the ground of polluting concentrations as a function of the characteristics of emission, orography, time stable atmospheric (wind and temperature) conditions.

33308 **APTIC NO. 55553**

Rissmann, E. F.

INFLUENCES OF IMPURITIES OF THE DEADBURNING OF LIMESTONE. *Preprint, p. 47-73, 1972. 16 refs. (Presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, 23rd, Cleveland, Ohio, March 6-10, 1972.)*

The applicability of infrared methods to the study of deadburning problems associated with various limestone scrubbing processes for sulfur dioxide removal from flue gases is illustrated. Infrared spectroscopy in combination with electron microprobe studies demonstrated reactions of impurities at high calcination temperatures with limestone and showed diffusion of some of these impurities or reaction products into pores and bulk surfaces. Infrared studies of the deadburning demonstrated that reactions of silica and other impurities with lime and limestone occur readily above 2300 F; the products of these reactions appear to be complex silicates with spectra very different from those of the impurities present before high temperature calcination. New thin film cells were developed for the infrared method, and groundwork was laid for extending the analysis techniques developed to slurries. The analyses developed were checked against results obtained with ultraviolet spectroscopy for a few samples, and good agreement was obtained.

33309 **APTIC NO. 55354**

Sandberg, James S.

OUR BOUNDED AIR. *Air Pollution, vol. 28, 29:4-8, 1972. 4 refs.*

Global, national, and local problems in determining the climatology of air pollution potentials are reviewed. Carbon dioxide and particulates are important possible factors in climatic change. The increase of CO2 is estimated at 10-15% over the last century, and the rate of increase has been rising in recent decades. The role of particulates is more complex, depending on their altitude, size, and absorptivity. At high altitudes they decrease the incoming solar radiation and lead to lowered temperatures. An Environmental Protection Agency report analyzed air pollution potential across the United States. Based on the climatology of mixing heights and associated wind speeds, over 60 maps were prepared of air pollution potential annually, seasonally, and by time of day for varying degrees of restriction to vertical mixing and downwind transport. Tracer tests conducted by the Bay Area Air Pollution Control District in 1967-1968 illustrate the terrain effect graphically. The results of one test are given. The particles released in San Francisco under inversion, corss to Oakland, and are channelled by terrain into the Santa Clara and Livermore valleys.

1971

33310 **APTIC NO. 55506**

Brazell, J. H.

WEATHER AND THE CLEAN AIR ACT. *Preprint, Nationl Society for Clean Air, Brighton, England, p. 56-64, 1971. 11 refs. (Presented at the National Society for Clean Air Conference, Folkestone, England, Nov. 2-5, 1971.)*

Recent work on the comparison visibility and the frequency of fog at several places before and after smoke control are reviewed. There was a dramatic reduction in the frequency of fog in central London and later at London (Heathrow) Airport. Smoke control commebced earlier and progressed faster in central London than it did near the airport. Similar improvements were observed at Manchester, Glasgow, and the West Riding of Yorkshire. There was a decline in fog frequency at many rural and urban sites. Average winter sunshine in centrl London during the decade 1958-1967 was substantially greater than the long term average, but there was no such increase in rural sites outside London. The evidence clearly indicates that these improvements in weather are associated with voluntary or enforced smoke abatement, and that the Clean Air Act has played a big part in the dramatic improvement in certain towns and cities. (Author summary modified)

33311 **APTIC NO. 55669**

Doury, A.

GENERAL AND PRACTICAL CALCULATION METHOD FOR NUMERIC FORECAST OF AIR POLLUTION. *(Une methode de calcul pratique et generale pour la prevision numerique des pollutions vehiculees par l atmosphere). Text in French. Meteorologie, no. 19:1-34, July-Sept. 1971. 11 refs.*

Numerical forecasting of pollution depends on the dimensions of polluted regions and the spatial fields of concentrations at any given moment. Practical solutions are proposed for the Einstein and the Taylor diffusion equations. Principal analytical forms in current use are discussed in relation to instantaneous emissions. Problems in atmosphere-surface exchanges are treated using a polyvalent general equation. Gaussian distribution, solar activity and lack of homogeneity of the field of movement of the carrier fluid are examined along with the effects of wind speeds, duration of emissions, transport, and exposure. All operations can be processed within operational periods by an electronic office computer with passive memory.

33312 **APTIC NO. 55399**

Fukushima, Madoka, Kin-ichiro Akita, and Isao Kasuya

EXPERIMENTS ON THE LOWER TROPOSPHERE USING AN ACOUSTIC SOUNDER. *(Tairyukenkabu no onpa tansa sochi ni yoru jikken). Text in Japanese. Denpa Kenkyusho Kiho (Rev. Radio Res. Lab.), 17(92):401-406, Sept. 1971. 5 refs.*

A new acoustic sounder has been utilized since in 1970 in a series of investigations into the structure of the lower troposphere. The acoustic sounding system is outlined, along with the possible mechanism of the echos received. Several example records applicable to the meteorology of the atmospheric boundary layer are presented. The height dependence of the intensity of small-scale temperature inhomogeneities is proportional to -5 powers of height at the height range 80 to 200 m. The sounder can be used to measure atmospheric structure.

33313 **APTIC NO. 57037**

Genikhovich, Ye. L. and L. Yu. Preobrazhenskiy

VERTICAL STRUCTURE OF THE TURBULENCE ENERGY ABOVE AN AGITATED SURFACE. *(Vertikal naya struktura energii turbulentnosti nad vznolnovannoy poverkhnost yu). Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:116-120, 1971. 7 refs. Translated from Russian, 8p.*

Pulsations in the longitudinal and vertical components of wind speed measured on marine expeditions in the North Atlantic from a floating Frud spar buoy and in the Baltic Sea from a structure mounted on the bottom are presented. A mathematical model is constructed for the additional generation of turbulent energy associated with the curvature of flow lines and a change in the curvature of the velocity profile near the boundary as the flow passes over a rough surface. Description of the nature of the airflow near a curved subjacent surface is accomplished by changing to flow coordinates in the equations of motion. The resultant equations are simplified by usual boundary layer theory methods, and in the case of slight curvature the first approximation of the wind speed at a certain level above the surface can be shown to depend only on the value of the flow function of the potential flow at this level. The nature of the vertical distribution of the turbulent energy averaged over time may be determined from the balance equation of turbulent energy. The turbulent energy is found from an equation to be proportional to the dynamic velocity and to decrease with increasing distance from the interface. Comparison of two of the equations developed shows that in the case of real flows the damping rate of boundary disturbances with altitude is clearly greater than what would be predicted by the theory of potential flows.

33314 **APTIC NO. 55528**

Kellogg, William W.

PREDICTING THE CLIMATE. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, MIT Press, 1971, p. 123-132. 9 refs.*

The atmosphere/ocean system and the need for a climatic model are discussed. The atmosphere/ocean system depends upon a balance in solar radiation which is both absorbed and reflected back into space. An increase in cloud cover, snow, and ice increases the albedo. The aerosols that fill the earth and the atmosphere play an important role in the radiation balance of the earth by increasing the albedo and absorbing sunlight. Terrestrial heat is lost by infrared radiation and balances the amount of heat gained by solar radiation. The main infrared absorbers are trace gases (water and carbon dioxide), aerosols, and clouds. A climatic model is necessary because aerosols and CO2 introduced by man may upset the radiation balance. The model must include calculations of ocean currents because of the heat capacity of the water. Both climate and turbidity need more accurate monitoring.

33315 **APTIC NO. 55497**

Lorenz, Edward N.

CLIMATIC CHANGE AS A MATHEMATICAL PROBLEM. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and C. G. Robinson (eds.), Cambridge, MIT Press, 1971, p. 179-189. 5 refs. (Also: J. Appl. Meteorol., p. 325-329, 1970).*

The climatic change is discussed as a mathematical problem. Formulating reasonable hypotheses regarding climatic change requires physical insight and ingenuity, but subsequently testing these hypotheses demands quantitative computation. Many features of today s climate have been reproduced by mathematical models (equations arranged for numerical solution by digital computers), similar to those used in weather prediction. Models currently in use generally predict only the atmosphere, and prespecify the state of its environment (oceans, land surfaces, sun). New models, where certain environmental conditions enter as additional dependent variables, should be suitable for testing climatic change hypotheses. Aspects of the atmosphere which play no role in these hypotheses may be highly simplified. A supermodel where virtually all not strictly constant features of the atmosphere and its environment enter as variables may ultimately lead to an acceptable theory of climatic change. (Author abstract modified)

33316 **APTIC NO. 55496**

Panofsky, Hans A.

INTRODUCTION TO THE SUBJECT OF MATHEMATICAL MODELING OF THE ATMOSPHERE. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, MIT Press, 1971, p. 190-199.*

Mathematical modeling of the atmosphere and modeling factors influencing climate are discussed. The seven variables on the state of the atmosphere, equations governing the variables, and special characteristics of climate must be considered in developing a model. Factors influencing climate are glaciation, clouds, carbon dioxide, and water vapor. Models are more unstable than the real climate due to the omission of clouds as free variables. Clouds act as thermostats contributing to the relative stability of the real climate. The determination of climatic effects due to changes of the aerosol distribution, quality, and amount due to human activity is not possible in the near future. A more self-determined model is needed to take clouds, polar caps, and aerosols into account to see what the effect of changed carbon dioxide concentration would be.

33317 **APTIC NO. 55492**

Robinson, G. D.

THE MAJOR POLLUTANTS: THEIR EMISSION AND ROLE IN THE ATMOSPHERE. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, MIT Press, 1971, p. 156-166. 17 refs. (Also: In: Long-Term Effects of Air Pollution--A Survey, National Air Pollution Control Administration, p. 3-9, 1970).*

The incidence of the major pollutant gases in the atmosphere are summarized. There is an increasing annual production of carbon dioxide from fossil fuel combustion of about 1 times 10 to the -10th power tons/yr. Estimates of the quantity of CO2 fixed in the biosphere are about 25% of the total atmospheric content. There is evidence of a fairly homogeneous population of soluble nuclei in the air near the surface in the world remaining empty spaces and in the stratosphere. The larger nuclei act as cloud condensation nuclei and have a natural concentration over oceans of around .001 cm. Carbon monoxide products by combustion processes is about 2 times 10 to the 8th power tons/yr and is 1-2% of CO2 production. If CO is removed from the atmosphere by oxidation, it will add negligibly to the CO2 pollution load. The volume concentration of sulfur dioxide in the upper atmosphere and over the oceans and remote land areas is as low as 2 times 10 to the -10th power. Its radiative influence is negligible. Nitrogen dioxide is a long lived fully mixed constituent of the atmosphere, while nitric oxide is a combustion product rapidly oxidized by ozone to NO2. Nitrogen dioxide is a key constituent of photochemical smog. Ozone is both a constituent of unpolluted air and a pollutant of major importance in photochemical smog. Its concentration in smog may be as high as 5 times 10 to the -7th power. Water pollution is already producing unpleasant modification of fog and drizzle frequencies near badly sited wet cooling towers, and thermal pollution of streams is leading to biological changes.

33318 **APTIC NO. 55494**

Robinson, G. D.

REVIEW OF CLIMATE MODELS. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, MIT Press, 1971, p. 205-215. 11 refs. (Also: In: Long-term Effects of Air Pollution--A Survey, National Air Pollution Control Association, p. 10-16, 1970.)*

Simple climatic change modesl are reviewed. The prototype of the model was created by Sawyer in which a 1% decrease in absorbed solar radiation caused a decrease in temperature in the equatorial section of about 0.75 C and in the polar section of about 0.6 C. Two elaborations described by Sellers and Rakipova are directly applicable to the problem of the climatic consequences of a change of albedo. For the investigation of the effects of pollution, current comprehensive models have very serious defects, they do not develop and transport cloud systems. Lack of this modification is a most serious shortcoming when the models are used to investigate climatic change because of the high sensitivity of climatic statistics to albedo, the sensitive dependence of albedo on cloud amount and type, and the critical relation of cloud amount and type to atmospheric motion and stability.

33319 **APTIC NO. 55495**

Smagorinsky, Joseph

LARGE-SCALE ATMOSPHERIC CIRCULATION. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, MIT Press, 1971, p. 200-204.*

The structure and variability of the global atmospheric circulation are discussed. Efforts to model the large scale atmosphere and to simulate its behavior numerically began more than 20 years ago. Multilevel models account for a variety of interacting influences and processes: large scale topographic variations, thermal differences between continent and oceans, variations in roughness characteristics, radiative transfer as a function of an arbitrary distribution of radiatively active constituents, large scale phase changes of water substance in the precipitation process, interactions with small scale convectively unstable motions, the thermal consequences of variable water storage in the soil, and the consequences of snow covered surfaces on the heat balance. Models have been used to detail characteristics of the observed climate, to show special atmospheric states in tests of transient predictability, and to simulate dispersion of inert trace material.

33320 **APTIC NO. 55458**

Sparrow, C. J. and L. N. Larsen

CLIMATOLOGICAL MEASUREMENTS AND AIR POLLUTION STUDIES IN AUCKLAND. *New Zealand Geographical Society, Proc. New Zealand Geogr. Soc., Geogr. Conf., 6th, 1971, p. 44-50. 16 refs.*

Sources of urban climatological/meteorological data available in Auckland, New Zealand are outlined, and results of data relating to wind direction, wind speed, temperature inversions, and synoptic conditions are presented. Most of the synopitc conditions in which inversions occurred were formed under stable anticyclonic conditions. The center of the high in many cases was east or west of New Zealand with a ridge of high pressure extending over Auckland. Surface winds became light at night, and clear skies helped the cooling of the air near the surface. The most persistent inversions formed when an intense anticyclone became stationary over the North Island. Inversions also formed with depressions centered over or near Auckland, provided the pressure gradient was weak. It appears from these preliminary studies that it should not be very difficult to forecast periods likely to favor air pollution conditions in the future.

33321 **APTIC NO. 55459**

Van der Hoven, I. (ed.)

ATMOSPHERIC TRANSPORT AND DIFFUSION IN THE PLANETARY BOUNDARY LAYER JULY 1970 - JUNE 1971. *National Oceanic and Atmospheric Administration, Silver Spring, Md., Air Resources Labs., NOAA-TM-ARL-32, 87p., 1971. 45 refs.*

A continuation of the study of atmospheric transport and diffusion in the planetary boundary layer, micrometeorology, diffusion climatology, and the application of this work to the disposal of radioactive waste gases into the atmosphere is reported. The research at Silver Spring centered on three dimensional trajectories in the Los Angeles Basin, planetary boundary layer dynamics, and energy profiles of small scale wind fluctuations. Research at the National Reactor Testing Station, Idaho, investigated building wake turbulence and diffusion, mesoscale transport and dispersion studies, and automated processing and graphics for the large data base 1969 Los Angeles study.

33322 **APTIC NO. 55447**

Wu, Ming-Shian and Joseph T. Zung

THE AERODYNAMIC CAPTURE OF AEROSOL PARTICLES BY WATER DROPS IN AIR. *Preprint, Missouri-Rolla Univ., Dept. of Chemistry, 34p., 1971 (?). 18 refs.*

The mechanisms of particle capture and coalescence of aerosols by a moving water drop in the atmosphere were studied using the boundary-layer flow approximation. The particle trajectory was computed by solving the equations of motion of the particle both outside and inside the boundary layer using the Adams-Moulton method, and the grazing trajectory was found by a trial and error technique. Collision and collection efficiencies of scavenging due to the particle inertia and to the velocity gradient of the flow field were then computed for water drops ranging from 0.1 to 1.0 mm in radius and for particles of 1 to 10 micron in radius. The results obtained by this mathematical analysis are in good agreement with experimental data given by Walton and Woolcock. (Author abstract modified)

33323 **APTIC NO. 57038**

Yeliseyev, V. S.

STEREOPHOTOGRAMMETRIC INVESTIGATION OF AIR FLOW IN THE BOUNDARY LAYER OF THE ATMOSPHERE ABOVE A HILL. *(Stereofotogrammetricheskoye issledovaniye vozdushnogo potoka v pogranichnom sloye atmosfery nad kholmom). Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:87-99, 1971. 19 refs. Translated from Russian, 18p.*

Experimental studies of the air flow in the boundary layer of the atmosphere above a hill (100 m high) situated in a valley were conducted by means of the stereophotogrammetric method of ground photography of smoke trails. The procedure involved trace methods of producing smoke trails, stereophotogrammetric equipment, an automatic apparatus for processing the pairs of stereo pictures, and an electronic computer for solving the algorithm of transformation of the coordinates of the object in question and calculation of the necessary parameters of the air flow structure. Orange vertical smoke trails were produced above the hill and were then photographed by the stereophotogrammetric apparatus with a 135 m base between the cameras. A total of approximately 500 stereo pairs were made, with the photography being conducted both in the morning and evening hours. Differences in the wind profile were viewed solely from the viewpoint of the dynamic influence of the hill on the flow due to the lack of temperature sounding. Examples are given for vertical distribution of the relative velocities at various sections of the hill. The maximum variation in relative wind speed is observed at an altitude of 5 m above the hill surface.

1967

33324 **APTIC NO. 57076**

Koshkin, A. M. and M. Ye. Berlyand (eds.)

INSTRUCTIONS FOR CALCULATING ATMOSPHERIC SCATTERING OF HARMFUL SUBSTANCES (DUSTS AND SULFUR DIOXIDE) CONTAINED IN INDUSTRIAL EMISSION SOURCES: SN 369-67. *(Ukazaniya po raschetu rasseivaniya v atmosfere vrednykh veshchestv (puli i sernistogo gaza), soderzhashchikhsya v vybrosakh promyshlennykh predpriyatiy SN 369-67). USSR Gosstroy, and A. I. Voyeykov Main Geophysical Observatory, State Committee of the U.S.S.R. Soviet of Ministers on Building and Construction, Hydrometeorology Publishing House, Leningrad, 1967. Translated from Russian, 76p.*

Instructions for calculating atmospheric scattering of harmful substances (dusts and sulfur dioxide) contained in industrial emission sources are presented. The method for calculating the scattering of these substances is based on the determination of their concentration in the near-earth layer which may be established at some distance from the emission point under undesirable meteorological conditions (when the wind velocity reaches a dangerous value and their is intense vertical turbulent exchange). The scheme is extended to organized emission of the harmful substances and does not apply to ground emission sources. Sample calculations of emissions are given for various industrial installations.

1958

33325 **APTIC NO. 57084**

Nose, Yoshikatsu, Yoshio Kitagawa, Sekio Ueno, and Shoichi Hirose

STUDIES ON THE SUSPENDED ATMOSPHERIC POLLUTION IN UBE CITY. (EFFECTS OF EXPOSURE TO AIR POLLUTION COMMUNITY HEALTH), THE 7TH REPORT, PART 1: NOTES ON THE RELATION BETWEEN SUSPENDED ATMOSPHERIC POLLUTION AND METEOROLOGICAL CONDITIONS. *(Ube-shi no fuyu baijin ni kansuru kenkyu (Shimin no hoken ni oyobosu taiki osen no eikyo ni kansuru kenkyu, sono 7, daiipen: fuyu baijin to kisho yoso tonokankei). Yamaguchi Idai Sangyo Igaku Kenkyusho Nenpo (Ann. Report Res. Inst. Ind. Med., Yamaguchi Med. School, vol. 6:25-32, 1958. 16 refs. Translated from Japanese, 39p.*

Hourly observations of suspended particulates and sulfur dioxide concentration and of meteorological conditions such as temperature, humidity, turbulence, wind velocity and direction, and amount of sunshine were conducted for a year and a half, beginning in 1957, from the roof (13 m above ground) of an office building in the center of Ube City. Suspended dusts and SO2 concentrations did not always run parallel with regard to time; the peaks of suspended pollution appeared soon after sunrise or sunset and always a little earlier and higher than those of SO2. The main factors governing the typical forms of diurnal variation of suspended particulates and SO2 concentrations were judged to be meteorological conditions, human activity, and the amount of sunshine. Wind velocity and direction were the main meteorological conditions responsible for modification of the typical forms of diurnal variation of pollutant concentrations. The concentration of suspended matter was generally more affected by wind velocity than direction, while SO2 was more affected by wind direction; this is probably due to the fact that the emitting sources of the suspended pollution were scattered throughout the city, while the SO2 sources were connected with locations of the chief emission sources.

BASIC SCIENCE AND TECHNOLOGY

1973

33326 **APTIC NO. 55589**

Japan Environmental Agency, Air Quality Bureau

AIR POLLUTION BY PHOTOCHEMICAL REACTIONS -- PRACTICAL GUIDE FOR EXAMINATION BY A SMOG CHAMBER. *(Kokagaku hanno ni yoru taiki osen -- sumoggu chanba chosa jisshi yoryo). Text in Japanese. 7p., July 1973.*

Smog chambers were used to study photochemical smog. Polluted air was irradiated by ultraviolet light, and the change of pollutants and production of secondary pollutants were examined. Sulfur dioxide, total hydrocarbons, methane, nitrogen oxides, nitrogen dioxide, nitric oxide, carbon monoxide, ozone, oxidants, peroxyacetyl nitrate, components of HC, total aldehydes, formaldehyde, and acrolein were measured. Analytical methods are mentioned. Wind, temperature, and humidity were also measured.

33327 **APTIC NO. 55368**

Basco, N. and R. D. Morse

ENERGY DISEQUILIBRIUM IN THE FLASH PHOTOLYSIS OF NO2. *Proc. Royal Soc. A., 334(1599):553-568, 1973. 28 refs.*

Energy disequilibrium in the flash photolysis of nitrogen dioxide was investigated. From measurements of the absolute concentrations of vibrationally excited oxygen produced in levels v double prime equals 4 to v double prime equals 13, it is concluded that about 20% of the exothermicity of the reaction O(3P) + NO2 yields nitric oxide + vibrationally excited oxygen (v double prime is equal to or less than 11) (reaction 1) appears initially as vibrational energy in O2. Vibrationally excited NO (v double prime equals 1, 2) is also observed and may be produced in this reaction or in the primary process NO2 + hv yields NO (v double prime is equal to or less than 2) + O (3P). More highly excited oxygen (v double prime is equal to or less than 15), with energy exceeding the exothermicity of the reaction, is produced in reaction 1 when the NO2 is first excited by radiation above the dissociation limit near 400 nm. The excited NO2 thus produced can also transfer energy to NO2 + NO (v double prime equals O) yields NO2 + NO (v double prime equals 1). (Author abstract modified)

33328 **APTIC NO. 55640**

Brocco, Domenico and Massimiliano Possanzini

STANDARD MIXTURES OF NITRIC OXIDE. *Anal. Letters, 6(8):685-690, 1973. 6 refs.*

Standard mixtures of nitric oxide were prepared by converting nitrogen dioxide to NO in presence of a molybdenum catalyst. The apparatus consisted of a temperature controlled condenser housing a NO_3 permeation tube, a mixing bulb, and a programmable temperature furnace containing the catalyst. The effluent from the tube, carried by ultrapure helium, was passed continuously through the converter. Dilution helium flow was then introduced into the system and adjusted to produce in the mixing bulb the desired test atmosphere. Quantitative conversion was obtained in the concentration range 0-100 ppm at temperatures as low as 200 C. Complete conversion of NO_2 to NO was obtained even at 100 C. However, working temperatures rather high (200-220 C) are required to increase the desorption rate of NO from the surface of the catalyst during the reduction process and avoid its deactivation by the molecules adsorbed. After a continuous 15 days exposure to 5 ppm NO_2, the efficiency loss due to the gradual oxidation of the metal surface was about 10%. This corresponds to a lifetime of about 2 yr if the mean concentration of NO_2 is 0.1 ppm. This material is scarcely affected by poisoning when exposed to high levels of nitrogen oxides. The standard gas can be used to calibrate NO-measuring instruments. (Author abstract modified)

33329 **APTIC NO. 55442**

Davidson, Richard W. and Dale G. Williams

AN INVESTIGATION OF PHOTOCHEMICALLY INDUCED REACTIONS IN A CHLORINE-OZONE SYSTEM AT -10.5 AND 0.0 DEGREE 1. *J. Phys. Chem., 77(21):2515-2520, Oct. 11, 1973. 33 refs.*

The photochemically induced reactions in a chlorine-ozone system at -10.5 and 0.0 deg 1 were investigated. The reactions were induced by light of wavelength 365-366.5 micron. The products of the system were removed from the reactor and dissolved in water. The water solution was tested for the ionic chlorine species chloride, hypochlorite, chlorite, chlorate, and perchlorate. Dichlorine heptoxide was the only stable chlorine oxide product of the reaction. The formation of dichlorine hyptoxide was studied with respect to the light intensity, reactant concentration, presence of diluents, temperature, and total pressure. The observed data and information already in the literature were used to develop a reaction mechanism which was based on the formation of a proposed Cl_2 atom-O_3 complex. Analysis of the mechanism showed that it adhered to the observed data, and the use of certain known rate constants allowed the attainment of several rate constants concerning the formation of the Cl_2 atom-O_3 complex. (Author abstract modified)

33330 **APTIC NO. 55423**

Dmitriyev, M. T. and V. A. Popov

SENSIBILIZATION OF THE PHOTOCHEMICAL OXIDATION OF NITRIC OXIDE. *(Sensibilizatsiya fotokhimicheskogo okisleniya okisi azota). Text in Russian. Zh. Fiz. Khim., 47(8):1994-1998, 1973. 14 refs.*

The sensibilization of the photochemical oxidation of nitric oxide at 293 K in long-wave ultraviolet light in the presence of benzene, cyclohexane, furane, tetrahydrofurane, sulfur dioxide, hexene-1, and hexene-3 was studied. The sensibilization of the photochemical oxidation of NO into nitrogen dioxide due to the above compounds and to direct oxidation by ozone was due to the formation of carbonyl compounds. The photochemical oxidation of NO was composed of a series of consecutive steps involving the formation and decomposition of NO_2 and the formation of ozone, for which a yield of one to four molecules of O_3 per molecule of NO_2 was found. Increase in the rates of ozone and NO_2 formation with increasing concentration of the sensibilizing agent relative to NO was observed. The sensibilization coefficients determined for benzene, cyclohexane, furane, tetrahydrofurane, SO_2, hexene-1, and hexene-3 are 0.024, 0.027, 0.064, 0.072, 0.082, 0.23, and 0.86, respectively.

33331 **APTIC NO. 55371**

Gupta, Satish K. and Charles E. Melton

A STUDY OF THE FORMATION OF NEGATIVE IONS IN NITRIC OXIDE AND THE INTERACTION OF NO WITH H- AND O- FROM WATER. *J. Chem. Phys., 77(22):2594-2598, 1973. 30 refs.*

The formation of negative ions in nitric oxide and the interaction of NO with hydrogen and oxygen ions from water was investigated. Three ions, O^-, NO^-, and NO_2^- were observed. The appearance potential of O is 7.O eV. A maximum cross section of 1.2 times 10 to the -18th sq cm/molecule was observed at 8.0 eV. The ions NO and NO_2^- are produced by termolecular reactions of the type $(NO)_2$ + e yields NO and NO and O^- + $(NO)_2$ yields NO_2^- and NO. An usually large rate constant of 7.6 times 10 to the -27th cu cm/sec was observed for the termolecular reaction producing NO_2^-. Mixtures of NO and H_2O were studied to determine the mechanism of the action of NO in radiolysis reactions. In addition to the O -NO reaction, a charge transfer reaction H^- + NO yields H + NO was observed with a rate constant of k equals 4.0 times 10 to the -9th cc/molecule/sec. The experimental value of the rate constant is in excellent agreement with the theoretical value derived on the assumption of locked dipole ion molecule interactions. The scavenger NO is actually a source of H atoms and thus of free radicals produced by the reaction of NO with H^-. (Author abstract modified)

33332 **APTIC NO. 55639**

Heidner, Raymond F., III, David Husain, and John J. Wiesenfeld

KINETIC INVESTIGATION OF ELECTRONICALLY EXICTED OXYGEN ATOMS, O(2 SUPERSCRIPT 1 D SUB 2) BY TIME-RESOLVED ATTENUATION OF ATOMIC RESONANCE RADIATION IN THE VACUUM ULTRAVIOLET. PART 2--COLLISIONAL QUENCHING BY THE ATMOSPHERIC GASES N_2, O_2, CO, CO_2, H_2O AND O_3. *J. Chem. Soc. Faraday Trans. II, 67(7):927-938, 1973. 64 refs.*

The electronically exicted oxygen O(2 superscript 1 D sub 2) was studied in absorption by time resolved attenuation of the atomic resonance radiation at lambda equals 115.2 nm (3 superscript 1 D superscript o sub 2 in the direction of 2 superscript 1 D sub 2). Absolute quenching coefficients for the removal of O(2 superscript 1 D sub 2) by the gases nitrogen, oxygen, carbon monoxide, carbon dioxide, water, and ozone are reported. These collisional processes are discussed within the context of the spin and orbital symmetry of reactants and products and are compared with previous laboratory and atmospheric measurements. (Author abstract modified)

33333 **APTIC NO. 55388**

Hellem, S. and Alan Williams

THE RATE OF COMBUSTION OF SINGLE DROPLETS OF SULPHUR. *Combustion Flame, 20(1):133-135, 1973. 3 refs.*

Burning rate coefficients from the slope of the plot of the diameter squared versus time for combustion of suspended droplets of sulfur to sulfur dioxide are presented for 20-270 C. Results obtained at higher temperatures (290-840 C) gave considerable scatter, but similar burning rate coefficients were obtained up to this latter temperature extreme. The coefficient was effectively constant over the lower temperature range and in moderate agreement with calculated values of burning rate coefficients. The combustion of sulfur essentially parallels the combustion of a high molecular weight hydrocarbons. The solid sulfur melts at 114.5 C and becomes micro-sulfur once its temperature rises above 159.9 C. This is a long chain polymer, its chain length decreasing until the boiling point of sulfur, 444.6 C is reached whereupon it is in the form of S_8 molecules. The vaporized molecules then burn in the spherical diffusion flame with oxygen to give sulfur dioxide.

33334 **APTIC NO. 55446**

Illing, Joseph W., Donald E. Gardner, and David L. Coffin

MOTORIZED EXERCISE WHEEL FOR EXPOSURE OF SMALL ANIMALS TO ENVIRONMENTAL POLLUTANTS RUNNING TITLE: SMALL ANIMAL EXERCISER. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Experimental Biology Lab., 10p., 1973 (?). 7 refs.*

The design and construction of a motorized exercise wheel for small laboratory animal inhalation studies on the interaction of pollutants and exercise is described. Animals are inserted into the individual wheels by separating adjacent wheels, thereby exposing their open sides. The animal is inserted, and each wheel in succession is pushed along the supporting rod to reappose the adjacent wheels. The wheel is driven by a common barbecue spit motor whose speed may be varied by a standard variable transformer from 1 to 6 rpm. The device is best suited for animals weighing 60 g or less and can be adapted for a variety of laboratory applications. Provision is made to prevent the animals from clinging to the sides of their individual wheel and hence avoiding exercise. Six rpm causes an animal to traverse a distance of approximately 0.3 mi in a 3 hr exposure. (Author abstract modified)

33335 **APTIC NO. 55422**

Jones, I. T. N. and Kyle D. Bayes

FORMATION OF O2(ALPHA 1 DELTA G) BY ELECTRONIC ENERGY TRANSFER IN MIXTURES OF NO2 AND O2. *J. Chem. Phys., 59(6):3119-3124, Sept. 15, 1973. 20 refs.*

The production of oxygen (alpha 1, delta g) was observed when mixtures of nitrogen dioxide and O2 are irradiated with light in the wavelength region 330-590 nm. The dependence of the signal on light intensity and concentrations suggests that the O2(alpha 1 delta g) is produced by transfer of electronic energy from excited NO2 to O2. The absolute energy transfer efficiency was measured at 366 nm by direct calibration against the amount of nitric oxide produced simultaneously by NO2 photolysis. The efficiency measured at other wavelength was then related to this absolute value. The O2(alpha 1 delta g) production efficiency depended on the wavelength of the light used to excite the NO2, reaching a maximum of 4.5% at 390 nm. A plot of this efficiency as a function of wavelength did not show any apparent discontinuity at 398 nm, the wavelength that corresponds to the first dissociation limit of NO2. (Author abstract)

33336 **APTIC NO. 55404**

Karu, Tiina, Uuve Kirso, and M. Gubergrits

KINETICS OF THE PHOTO-INDUCED COOXIDATION OF BENZO(A)PYRENE AND PHENOLS. *Text in Russian. Eest. N.S.V. Tead. Akad. Toim. Keem. Geol., no. 3:217-223, 1973. 19 refs.*

The kinetics of the cooxidation of the carcinogenic polycyclic hydrocarbon, benzo(a)pyrene, with phenols of various structures (o-, m-, p-cresols, phenol, 2,6-ditertbutyl-p-cresol, 4-nitro-, and 2,4-dinitrophenols) induced by UV-irradiation in 96% ethanol and n-octane was studied. The values of the reaction rate constants under the separate or simultaneous oxidation of the phenols and the sigma-constants correlate well. The presence of benzo(a)pyrene in the system will, as a rule, cause a decrease in the oxidation rate of the phenols. At the same time, all the phenols studied will promote the degradation of benzo(a)pyrene.

33337 **APTIC NO. 55623**

Kato, T.

CAUSE OF PHOTOCHEMICAL SMOG EMISSIONS. *(Kokagaku smogu no hassei genin ni tsuite). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Chem. Ind.), 26(9):545-547, Sept. 1973.*

Photochemical smog may be due to the reaction of toluene from automobile exhausts with oxygen to give aldehydes, ketones, methyls, and ethyls. Acrolein causes eye irritation and methyl nitrite causes respiratory disease. Photochemical smog has been generated in industrial areas and near highways. Tokyo s pollution is similar in composition to automobile exhaust gas. In Tokyo, 1.2 ppm of methyl nitrate and 419 ppb acrolein were measured. Automobile exhaust gas was experimentally irradiated with ultraviolet radiation. The results corresponded to the atmospheric state. Air pollution episodes, meteorological conditions affecting smog formation, and other factors are discussed.

33338 **APTIC NO. 55628**

Ohkita, T.

SOME ASPECTS ON PHOTOCHEMICAL SMOG. *(Kokagaku sumogu ni tsuite). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Chem. Ind.), 26(9):539-541, Sept. 1973.*

The amount of oxidants formed by photochemical reactions is proportional to the amount of nitrogen oxides and hydrocarbons in the air. Los Angeles and Tokyo photochemical smogs seem to be essentially the same. Measurement methods, photochemical smog reaction mechanisms, sulfuric acid mists, toxicity, and plume behavior are discussed.

33339 **APTIC NO. 55650**

Schiff, H. I.

KINETICS OF OZONE PHOTOCHEMISTRY. *Pure Appl. Geophys. (Basel), vol. 106-108:1464-1467, 1973. 12 refs.*

The photolysis of ozone in the ultraviolet Hartley Band produces metastable oxygen atoms and molecules. At wavelengths shorter than 3100 angstroms, the primary quantum yield is probably unity but greater uncertainty exists about its value at longer wavelengths. At 2500 angstroms, O2(1Delta sub g) is produced with near unit efficiency, and there is some evidence that singlet O2 is also a primary product at the short wavelength end of the Huggins band. The O2 (1Sigma+ sub g) is not a primary photolytic product at 2500 angstroms but is produced as a secondary product from the rapid reaction of O(1D) with the ground state O2. O(1D) reacts rapidly with O3 although the nature of the products of this reaction has not been unequivocally established and there is now strong evidence against the occurrence of energy chains in dry ozone. The reaction of O(3P) atoms with O3 has an activation energy of 4.4 kcal/mole. (Author summary)

33340 **APTIC NO. 55694**

Singh, Trilochan and Robert F. Sawyer

KINETIC MODEL FOR AFTERFLAME ZONE OR PREMIXED ETHANE/OXYGEN AND ETHYLENE/OXYGEN FLAME. *Environ. Sci. Technol., 7(11):1034-1039, Nov. 1973. 23 refs.*

A kinetic model for the reaction in an afterflame zone of premixed ethane/oxygen and ethylene/oxygen flame was developed. The reactions, supported on a water cooled rectangular flat flame burner, were investigated at equivalence ratios of 0.67, 0.80, and 1.00, pressures of 0.083 and 0.054 atm and in the temperature range of 1500 to 1700 K. Temperature and composition profiles for carbon monoxide, carbon dioxide, oxygen, nitrogen, water, argon, and hydroxide radical were measured. Theoretical flame structures were calculated by numerical integration of the coupled kinetic rate equations and the diffusion equations. Measured temperature profiles were employed obviating the necessity for including the energy conservation relations. A consistent disagreement was obtained between the observed and calculated profiles of CO, CO2, OH, H2O, and O2. A systematic variation in the value of rate coefficients for various ractions and initial estimates for the radical species (H and O) concentrations leads to a good qualitative agreement between the theoretical and experimentally observed mole fraction profiles. The recommended literature value for kCO + OH (5.6 times 10 to the 11th power exp -1080/Rt cu cm/mole/sec) has to be increased by a factor of two to produce agreement between the measured disappearance rate of CO and that calculated from the postulated reaction mechanism. (Author abstract modified)

33341 **APTIC NO. 55380**

Stedman, D. H. and H. Niki

KINETICS AND MECHANISM FOR THE PHOTOLYSIS OF NITROGEN DIOXIDE IN AIR. *J. Phys. Chem., 77(22):2604-2609, 1973. 28 refs.*

The photolysis of low concentrations (0.9-100 ppm) of nitrogen dioxide in air was investigated using nitric oxide/ozone chemiluminescence detectors. The rate constants of three of the elementary reactions were directly determined at 298 K: 2NO + oxygen yields 2 NO2, k10 equals 4.0 + or 0.2 times 10 to the -38th power cm to the -6th power/sec; NO2 + O3 yields nitrogen trioxide + O2, k4 equals 6.5 + or 0.8 times 10 to the -17th power cu cm/sec; NO + O3 yields NO2 + O2, k3 equals 1.73 times 10 to the -14th power cu cm/sec. The rate constant ratio for O + NO2 yields O2 + NO to O + O2 + M yields O3 + M was also determined. (Author abstract)

33342 **APTIC NO. 55425**

Stedman, D. H., C. H. Wu, and H. Niki

KINETICS OF GAS-PHASE REACTIONS OF OZONE WITH SOME OLEFINS. *J. Phys. Chem., 77(21):2511-2514, Nov. 21, 1973. 11 refs.*

Gas phase reactions of ozone with ethylene, propylene, trans-2-butene, and 1-hexene were studied at 297-301 K using a 45-liter static reactor and low reactant concentrations (approximately m torr) at 760 torr total pressure. Ozone was analyzed by the nitric oxide/O3 chemiluminescence method, while hydrocarbons were monitored by gas chromatography. The kinetics were studied in both hydrocarbon and O3 excess conditions in the presence and absence of oxygen. Absolute values of the second order rate constant were 1.55 + or 0.15, 12.5 + or - 1, 275 + or 23, and 11 + or - 1.5 times 10 to the -18th power cu cm/molecule/sec for C2H4, C3H6, trans-2-C4H8 and 1-C6H12, respectively. For C3H6 and trans-2-C4H8, a stoichiometry of unity was observed in both nitrogen and air diluents. (Author abstract)

33343 **APTIC NO. 55624**

Suzuki, S.

GENERAL REPORT ON THE FIRST MEETING OF JAPAN-AMERICA PHOTOCHEMICAL ATMOSPHERIC POLLUTION COMMITTEE. *(Dai ikkai nichi-bei kokagaku taiki osen iinkai ni shusseki shite). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Chem. Ind.), 26(9):536-538, Sept. 1973.*

A meeting between Japanese and American environmental officials is described. The relationship between oxidants and hydrocarbons in the formation of photochemical smog, the effect of automobile exhausts on smog formation, measurement methods, field and laboratory studies, smog toxicity, and the differences between Japanese and American smog were discussed.

33344 **APTIC NO. 55574**

Walther, E. D. and V. A. Mohnen

GAS INTERACTIONS WITH HEATED POLYMER SURVACES. *American Chemical Society, Washington, D. C., 57p., 1973. 20 refs. (Presented at the American Chemical Society, National. Meeting, 166th, Chicago, Ill., Aug. 26-31, 1973.)*

The thermoparticulate interaction of gas with heated polymer surfaces was investigated. Using a condensation nuclei counter, a mass flow rate down to 10 to the -15th power g/sec of molecular fragments originating from the surface of the polymer material can be observed. Depending on the nature of the polymer, the carrier gas and the trace gas, either an enhancement or a suppression of particle productions from the heated polymer was observed. Trace gases investigated were carbon monoxide, sulfur dioxide, hydrogen sulfide, ammonia, chlorine, nitrogen dioxide, nitrous oxide and ethylene and polymers included polystyrene-2- ethylhexylacrylate, polyvinyl chloride, and paraffin wax. The theory developed to explain thermoparticulate production enhancement by reactant gases is based on chemical reaction between the reactant gas and reactant molecules at hose links that have been most weakened by thermal agitation. Successive scissioning of the reactant molecules finally leads to molecular fragments short enough (and volatile enough) to escape from the reactant surface. (Author abstract modified)

33345 **APTIC NO. 55374**

Wu, C. H., E. D. Morris, Jr., and H. Niki

THE REACTION OF NITROGEN DIOXIDE WITH OZONE. *J. Phys. Chem., 77(21):2507-2511, Oct. 11, 1973. 12 refs.*

The mechanism and rate constant of the reaction nitrogen dioxide + ozone yields nitrogen trioxide + oxygen were investigated at the ppm concentration level. A chemiluminescent detection method was used to monitor the decay of O3 in excess NO2. From these data a rate constant of 4.4 times 10 to the -17th power cu m/molecule/sec at 26 deg was determined with an uncertainty of + or 15%. Long path infrared was used to measure the overall stoichiometry (delta NO2/delta O3). Since the primary reaction is rapidly followed by the reversible reaction NO2 + NO3 yields nitric anhydride, the observed stoichiometry ranged from 1.65 to 2.00. (Author abstract)

33346 **APTIC NO. 55362**

Yamamoto, Masaharu, Katsuya Nagata, and Hajime Saito

STUDY ON THE FORMATION MECHANISM OF NITROGEN OXIDES. *(Nox seisei kiko ni tsuite no ichikosatsu). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 129-132, 1973. 3 refs. (Presented at the Japan Society of Mechanical Engineers, 51st Meeting, Fukuoka, Japan, Oct. 16-17, 1973.)*

The mechanism of nitrogen oxides formation was studied during combustion of a thin air/fuel mixture. Calculations based on the Zeldovich mechanism produced values agreeing with those obtained from an actual experiment as far as the nitrogen formation in the rear stream of the flame is concerned. However, this mechanism did not explain the NOx formation rate on or about the flame surface of a thick air/fuel mixture. The amount of NOx generated in the neighborhood of the flame surface estimated the reaction mechanism. An air/fuel mixture premixed with nitric oxide was used to observe the reaction of NO with the flame surface. The amount of NOx formation was greatest with an excess air ratio of 1.0 or 0.75. When the excess air ratio was smaller than 1.0, the NO formation in the rear stream of the flame surface could be explained by the Zeldovich mechanism. The NO formation accelerates and more NO is produced, especially when the excess air ratio is low (around 0.75).

1972

33347 **APTIC NO. 55612**

Datta, Parimal and Stuart B. Reed

A FLAME STRUCTURE STUDY OF THE STABILIZING REGION OF A FUEL-RICH FLAME AND THE EFFECTS OF VITIATION. *Combustion Flame, 19(1):89-99, 1972. 14 refs.*

The techniques developed for detailed flame structure studies were used to analyze the stabilizing region of a fuel rich methane air flame, with and without vitiation of the secondary combustion air. Detailed temperature, velocity, and composition measurements are given, covering a two dimensional stabilizing region; also given are heat release rate distributions and species fluxes derived from these measurements. The maximum heat release rate in the stabilizing region of these fuel rich flames is much less than for the stoichiometric methane/air flame. The results indicate that the greater stability of a fuel rich flame, compared with a stoichiometric flame, is due to a heat interaction between the primary and secondary combustion zones in the stabilizing region of a fuel rich flame. The decrease in the magnitude of this interaction is responsible for the large reduction in stability of fuel rich flames that can be brought about by secondary vitiation. (Author abstract modified)

33348 **APTIC NO. 55393**

Guenther, R. and G. Janisch

MEASUREMENTS OF BURNING VELOCITY IN A FLAT FLAME FRONT. *Combustion Flame, 19(1):49-53, 1972. 15 refs.*

A method for measuring the burning velocity of a fuel-oxidant system, a useful property for interpreting combustion phenomena and one which varies with mixture composition, temperature, and pressure is presented which overcomes the effects on measurement of curvature of the flame front, heat losses to the burner and parallel to the flame front, or intermixing with the surrounding atmosphere. The method consists of measuring the burning velocity in the central stream-tube of a button-shaped flame with the particle track method. The burning velocity here is equal to the velocity at the point where the first sensible temperature rise occurs. Experimental data for methane-air, hydrogen-air, and carbon monoxide-air mixtures at an initial temperature of 293 K and atmospheric pressure are presented. A comparison with data from a cone-shaped flame shows differences which are attributed to the above-mentioned influences. (Author abstract modified)

33349 **APTIC NO. 55415**

Haut, H. van

TEST CHAMBER METHOD FOR DETECTION OF PHYTOTOXIC AIR POLLUTANTS. *(Testkammerverfahren zum Nachweis phytotoxischer Immissionskomponenten). Text in German. Environ. Pollut., 3(2):123-132, 1972. 12 refs.*

Portable exposure chambers have been developed in which plants are exposed to filtered and unfiltered air for the purpose of identifying the presence of phytotoxicants in the air. The chambers consist of a plexiglass cap covering the plants to be exposed and a box below containing an air filter, blower, and watering system; an experimental unit includes at least two such chambers. Ambient air is passed directly through the test chamber and is filtered before entering the control chamber in order to remove any phytotoxicants present. The effects of pollutants can be accurately identified by comparison of the plant reactions in both chambers. Individual pollutants can be identified by using special filtering systems and with combinations of indicator plants with differing resistance. A filter material coated with silver and silver oxide is used to remove the most important pollutants, sulfur dioxide, hydrogen fluoride, and hydrogen chloride. The filter material is also very effective in preventing leaf injuries to the tobacco variety BEL W3 which is very sensitive to oxidants. The exposure chambers may be used to conduct fumigation experiments both in the field and in climatic chambers as well as to test pesticides.

33350 **APTIC NO. 55408**

Lombardi, C. and E. Pedrocchi

A PRESSURE DROP CORRELATION IN TWO-PHASE FLOW. *Energia Nucl. (Milan), 19(2):91-99, Feb. 1972. 12 refs.*

A correlation for predicting total pressure drops in two-phase gas-liquid flow has been proposed which generally holds at all conditions for which dispersed or annular dispersed flow is obtained over most of the duct. The total pressure drop along the duct was subdivided into three terms (head, acceleration, and friction), reference being made to an energy balance. The friction term was empirically correlated by properly displaying the effect of various parameters on the basis of ad hoc experiments, while no correlated quantities were needed to predict overall pressure drops. The correlation was thoroughly verified in a number of conditions over a wide range of variables. A discrepancy may arise in correspondence between single-phase and two-phase pressure drop correlations as a direct consequence of the experimental behavior which may show a rather rapid trend variation of pressure drops in the vicinity of unit quality. Acceleration and friction terms may not be singly correct, but their sum is correctly predicted. The correlation can be easily adjusted to better represent particular conditions. (Author abstract modified)

33351 **APTIC NO. 55683**

Suzuki, Motoyuki and J. M. Smith

AXIAL DISPERSION IN BEDS OF SMALL PARTICLES. *Chem. Eng. J. (Netherlands), no. 3:256-264, June 1972. 10 refs.*

Fixed beds of small catalysts particles are frequently used for kinetic studies of gas-solid catalytic reactions. A chromatographic technique was employed to evaluate axial dispersion coefficients in beds of porous catalyst particles and beds of non-porous glass beads (0.1-1 mm) over a range of velocities from 0.00237-11.9. Two gaseous systems (helium in hydrogen and oxygen in nitrogen) were used to provide different molecular diffusivities. Correlation of the results was possible by the addition of two terms: one due to molecular diffusion which is dominant at low velocities and a second term due to convective mixing which is dominant at high velocities. Unusually high values of axial dispersion coefficients for porous particles at low velocities were explainable by including a contribution due to intraparticle diffusion. Peclet numbers approached constant values which were proportional to particle diameter at high velocities. Channeling in the bed due, for example, to shrinkage of catalyst particles as a result of reduction in situ or movement of particles caused a large increase in axial dispersion. (Author abstract modified)

1971

33352 **APTIC NO. 55542**

Drkal, Frantisek

THEORETICAL DETERMINATION OF FLOW RATIO IN SUCTION SLITS. *(Theoretische Bestimmung der Stroemungsverhaeltnisse bei Saugschlitzen). Text in German. Heizung-Lueftung-Haustech., 22(5):167-172, May 1971. 4 refs.*

The mathematical determination of the ideal suction slit in suction installations for absorption of dusts, gases, and fumes is presented. The potential flow ratio for an ideal slit is calculated. The stream flows evenly on an optional surface. The suction slit projected on the plane is replaced by the distribution of countersinks along the abscissa, where all parts of the total flow volume join with productivity. The resulting current field is symmetrical to the x axis. The x axis corresponding psi flowline represents the projection of the partition bordered by the half plane. When the unit of length of abscissa b expresses the q productivity, the length element dl corresponds to efficiency q times dl. For dl with a productivity q times dl higher than O in an optional point, according to the basic theory of the even potential flow, the potential function is d phi equals-q times dl multiplied by ln m divided by 2 pi, where m is the distance of the element from the optional point.

33353 **APTIC NO. 55387**

Soroka, B. S.

THE AERODYNAMICS OF AN OPEN PLUME FOR FLAT-FLAME BURNERS WITH A TWISTED FUEL-MIXTURE FLOW. *High Temp. (English translation from Russian of: Teplofiz. Vys. Temp.), 9(5):1005-1014, Sept.-Oct. 1971. 20 refs.*

The motion of gases in the open flame of a flat-flame burner was mathematically investigated and reduced to boundary-layer equations which in turn were transformed into a system of ordinary differnetial equations of self-similar solutions. The solution for the system of equations describing the potential isothermal and nonisothermal flows was derived, and experimental research demonstrated that the principal velocity component in the open plume is radial. Empirical relationships for the calculation of this component are included. (Author abstract modified)

1963

33354 **APTIC NO. 57090**

Wankel, F.

MESHING ENGAGEMENT. *(Kammeingriff). In: Ein Tiel und der Rotations-Kolben Maschinen. 1963, Chapt. 6, p. 18-23. Translated from German, 14p.*

Rotary and rotating piston machines and engines are analyzed with respect to a number of possible variants and their application as two or four stroke engines for use as automotive, aircraft, or steam engines. Historical designs as well as modern developments are reviewed, and a variety of possible engagements (lifting, rotary, meshing, slip, and counter-engagement) are represented in several illustrations with accompanying description. (Author abstract modified)

1962

33355 **APTIC NO. 57095**

Wieland, Th., G. Luben, and H. Determann

CHROMATOGRAPHY OF POLYCYCLIC AROMATICS ON ACETYLATED CELLULOSE, III. *(Chromatographie polycyclischer Aromate an acetylierter Cellulose, III). Kurze Mitt. Exp., 9(18):432, 1962. 5 refs. Translated from German, 2p.*

A method for chromatographic separation of polycyclic aromatic hydrocarbons is presented which uses a highly acetylated cellulose powder spread on glass plates from a suspension in alcohol. The heavily acetylated cellulose powder is stirred with alcohol to a spreadable paste, applied in the customary manner as a thin layer on glass plates, and set to dry in air. The mixture of substances to be examined chromatographically is applied in the form of a minute drop of a diluted methanolic solution. A mixture of methanol-ether-water (4:4:1 by volume) has proven best as a flow medium and rises approximately 10 cm in 40 min. The plate is dried in air after the first pass, and the flow medium is permitted to rise twice again in the same manner.

1947

33356 **APTIC NO. 57082**

Schnellen, C. G.

METHANE FERMENTATION. *Delft Technical Univ. (Holland), Thesis (Ph.D), March 26, 1947, 28p. 16 refs.*

Experiments with methane bacteria indicate that in the conversion of carbon monoxide by pure cultures the primary reaction in which carbon monoxide participates is that of the conversion to carbon dioxide and hydrogen; the conversion of these primary products into acetic acid does not, however, form a part of methane bacteria metabolism. The latter conversion occurs under the influence of Cl. aceticum bacteria which are present in crude cultures; the synergistic action of this organism is not indispensable to the formation of methane. Methane bacteria themsleves are able to convert carbon dioxide and hydrogen into methane. These results, and the fact that Mb. Omelianskii is unable to convert carbon monoxide, exclude the possibility that this gas acts as an intermediary hydrogen acceptor in normal methane fermentation. No compound with one carbon atom has been found which can replace carbon dioxide as a hydrogen acceptor. Investigation of the conversion of carbon monoxide into carbon dioxide and methane by Mb. formicicum and Ms. Barderii has revealed that, in the former case, fermentation is tied to a relatively low pressure of carbon monoxide. Ms. Barkerii is capable of bringing about the reaction even in an atmosphere of pure carbon monoxide, and the conversion seems to be one of the simplest, if not the simplest, of the fermentation processes yet known.

EFFECTS-HUMAN HEALTH

1973

33357 **APTIC NO. 55313**

Abe, K., S. Imai, K. Komuro, M. Oda, and A. Otani

INFLUENCE OF AIR POLLUTION ON THE RESPIRATORY ORGAN OF THE INHABITANTS OF ISOGO-KU YOKOHAMA CITY, PART III. MORBIDITY OF RESPIRATORY DISEASES IN 1972. *(Yokohama-shi Isogo-ku ni okeru taiki osen no kokyuki ni oyobosu eikyo, dai 3po, kokyuki shojo yushoritsu). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(21):519, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973.)*

Respiratory disease morbidity was studied in 719 people in Yokohama city older than 40 years old by questionnaires. Results for 1971 and 1972 are compared. Air pollution in the area was 0.03 ppm sulfur dioxide/yr on the average and 8 tons/sq km/yr falling dust. Symptoms included coughing in the winter, sputum on winter mornings, sputum during the day and night, continuous cough and sputum, aggravation of cough or sputum, gasping, and chronic bronchitis symptoms. Respiratory diseases were more frequent in women, and morbidity increased with age. Smokers had more symptoms than nonsmokers. Respiratory diseases increased from 1971 to 1972, although air pollution did not increase. Thus, exposure to low air pollution for a long time may increase morbidity of respiratory diseases. Vital capacity decreased with age and was lower in women.

33358 **APTIC NO. 55603**

Albu, A. and E. Schuleri

SOME ASPECTS OF THE DIFFUSION OF THE ALVEOLO-CAPILLARY MEMBRANE IN OCCUPATIONAL PULMONARY SIDEROSIS. *(Quelques aspects de la diffusion alveolo-capillaire dans la siderose pulmonaire professionnelle). Text in French. Arch. Maladies Profess. Med. Trav. Securite Sociale (Paris), 34(6):345-349, June 1973. 4 refs.*

Diffusion of carbon monoxide through the alveolo-capillary membrane expressed by diffusion capacity (DpCO) and by the diffusion constant (DpCO/VA) was determined in 13 patients suffering from occupational pulmonary siderosis (iron poisoning) by the Teculesco and Stanesco technique of single inspiration followed by apnea which determines CO and helium concentration in inspired and expired air. Results of the study disclosed that DpCO and DpCO/VA values were not significantly altered by occupational pulmonary siderosis; thus a CO diffusion test through the alveolo-capillary membrane is not indispensable as an examination method used in the diagnosis of siderosis in the absence of complications or of pathological associations. No significant correlation was established between the parameters measured and endogenic or exogenic factors. Thus occupational pulmonary siderosis should not be classified among intestitial diffuse fibroses, a finding corroborated also by determination of pulmonary ventilation.

33359 **APTIC NO. 55708**

Ban, K., F. Horie, A. Fujisawa, M. Tsuda, T. Okumura, and Y. Tsunetoshi

THE INFLUENCE OF ALUMINUM SMELTER EXHAUST ON HUMAN HEALTH IN THE MISHIMAOKA AREA IN IBARAGI CITY. *(Ibaragi-shi Mishimaoka chiku ni okeru arumi yokairo haigasu ni yoru jintai kenko eikyo chosa). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan J. Public Health), 20(10), 1p., 1973. (Presented at the Japan. Society of Public Health, Annual Meeting, 32nd, Oct. 1973, Paper 534.)*

Residents of an area near an aluminum smelter were studied by questionnaires and medical examinations for symptoms of eye and respiratory diseases. Complaints were most frequent near the factory. Conjunctivitis occurred in 44 persons, rhinitis in 72, pharyngitis in 14, and laryngitis in 21. Twice as many persons had eye and nose irritation than had no irritation.

33360 **APTIC NO. 57029**

Borisenkova, R. V., Ye. P. Krapukhina, S. I. Lagunov, and O. P. Rushkevich

WORKING CONDITIONS AND DUST-RELATED OCCUPATIONAL DISEASES AT AN OPEN COAL PIT. *Gigiena i Sanit., 38(2):40-43, Feb. 1973. Translated from Russian, 6p.*

An examination of the working conditions and employee health status at the Korkinskiy open coal pit was performed to assess the impact of production and occupational health measures instituted between 1959 and 1970. Production dust at the pit was found to be very fine (85-95% of the dust particles having a diameter up to 6 micron) and to contain a significant quantity of free silicon dioxide. Carbon monoxide and nitrous oxides were found to be within limits of allowable quantities in productive sections, although carbon monoxide content within 10-20 min after blasting at the bottom of the pit was higher than the allowable limit. The microclimate was found to be far from satisfactory, with relative humidity in the excavation and drilling machine compartments being 44-62% and the rate of air movement on the surface being 1.5-2.8 m/sec; on isolated days the temperature of the outer air in the mine will reach 30-31 C. X-ray examination of 154 miners revealed anthracosis in the first stage of interstitial form in 4 excavator operators. An insignificant lowering of external breathing function appeared in 25% of 90 workers examined, corresponding to first degree respiratory inefficiency. The small number of cases with pneumoconiosis, the relatively benign manifestation, and the comparatively low content of dust in the air allows the possibility, with further implementation of anti-dust measures, of eliminating pneumoconiosis in open-pit miners.

33361 **APTIC NO. 55611**

Buttgereit, G.

MODIFIED ATOMIC ABSORPTION SPECTROSCOPIC METHODS IN ANALYSES OF TRACE METALS. *(Modifizierte atomabsorptionsspektroskopische Methoden zur Metallspuren-Analytik). Text in German. Fresenius Z. Anal. Chem., 267(2):81-88, 1973. 5 refs. (Presented at the Spurenanalyse, Erlangen, West Germany, April 2-5, 1973.)*

Flame and flameless atomic absorption spectroscopy is discussed. Interferences are caused by the bonding state of the atoms, background absorption, viscosity, and surface tension. A laboratory-made device with a background compensator which can be used for the flameless mercury analysis and a laboratory-made tantalum furnace for flameless high temperature analysis are discussed. The interferences by absorption superimpositions and optimisations in the direct analysis of heavy trace metals in urine, blood, or serum are discussed in detail for commercial graphite furnaces. The detection limits with the graphite curvette HGA-72 are 2000 ppb for lead in alkali-chloride, 50 ppb in urine and 100 ppb in blood. For cadmium, the detection limits are 50 ppb in alkali-chloride, 1 ppb in urine, and 10 ppb in blood.

33362 **APTIC NO. 55429**

Camner, Per, Per-Ake Hellstrom, and Margot Lundborg

COATING 5 MICRON PARTICLES WITH CARBON AND METALS FOR LUNG CLEARANCE STUDIES. *Arch. Environ. Health, 27(5):331-333, Nov. 1973. 10 refs.*

The coating of 5 micron Teflon particles with carbon and metals for lung clearance studies is described. By evaporation in a vacuum, the particles (density, 2 g/cu cm) were coated with aluminum, beryllium, carbon, chromium, lead, manganese, silver, and uranium. After retention for 1 wk in 0.9% sodium chloride solution at 37 C, most of the particles were coated more than 50% with all elements. The coatings remained after 1 mo except for Pb and U. Aerosols of the coated particles were produced, and about 90% of the particles occurred in a single form. The thickness of the coats was calculated to be a few hundredths of 1 micron and the increase in aerodynamic diameter a few tenths of 1 micron. As the particles coated with different elements are similar in size and in aerodynamic diameter, they should be useful in the study of the elimination mechanisms for inhaled particles. Phagocytosis in vitro by rabbit alveolar macrophages during a 1.5-hour exposure to particles coated with Pb, Ag, and C was studied. The C coated particles were phagocytized at a significantly higher rate than Ag and Pb coated particles. (Author abstract modified)

33363 **APTIC NO. 55632**

Chow, Ching K. and Al L. Tappel

ACTIVITIES OF PENTOSE SHUNT AND GLYCOLYTIC ENZYMES IN LUNGS OF OZONE-EXPOSED RATS. *Arch. Environ. Health, 26(4):205-208, April 1973. 37 refs.*

The pulmonary effects of environmental oxidants were investigated by exposing Sprague-Dawley rats to 0.8 ppm ozone for 7 days. The activities of pentose shunt and glycolytic enzymes of the lungs were significantly increased. Alphatocopherol partially retarded the elevation of glucose-6-phosphate dehydrogenase (G-G-PD), 6-phosphogluconate dehydrogenase (6-P-GD), and malic enzyme, but not of others. In a separate exposure of rats to 0.75 ppm O3, the activities of glutathione (GSH) peroxidase, GSH reductase, G-6-PD, 6-P-GD, and pyruvate kinase decreased initially and then increased above their respective controls. The results can be partially attributed to increased needs or reductive detoxification of lipid peroxide. Increased activities may be related to the development of adaptation by the animals. (Author abstract modified)

33364 **APTIC NO. 55372**

Colldahl, Helge

INHALATION TESTS WITH VARIOUS DUSTS AND MITE EXTRACTS. *Acta Allergol., 28(3):187-201, 1973. 9 refs.*

Dust sensitive asthma patients were investigated by intracutaneous titration and by inhalation tests with different mite extracts as well as with different dust extracts from the Stockholm and Jonkoping areas. Extracts from D. pteronyssinus provoked asthma in concentrations up to 3000 times more diluted than ordinary dust extracts. A common antigen is present in D. pteronyssinus and in house dusts from the Stockholm and Jonkoping areas. A pteronyssinus extract gave by intracutaneous testing in most dust sensitive patients a positive skin reaction at a concentration 10-1000 times weaker than the corresponding culture medium extract. This may be a sign of mite sensitivity. Disodium cromoglycate inhibited asthma in inhalation tests, confirming earlier results. At high concentrations, the culture medium extract can provoke asthma. It is recommended that the concentration necessary to provoke asthma be investigated both with pteronyssinus extracts and with culture medium extracts. (Author summary modified)

33365 **APTIC NO. 55609**

Ferris, Benjamin G., Jr.

GEOGRAPHIC DISTRIBUTION OF CHRONIC BRONCHITIS. *Bull. Physio- Pathol. Respir. (Nancy), 9(4):1121-1129, July/Aug. 1973. 24 refs.*

Limited information is available on the geographic distribution or chronic bronchitis or chronic lung disease. Much of the difference that has been reported between countries seems to be due to differences in cigarette smoking habits, although levels of air pollution, and, in selected circumstances, different occupational exposures, may also account for some of the variables. More studies of various populations are needed and they should be comparable with each other in order to obtain optimal information. (Author abstract)

33366 **APTIC NO. 55741**

Festy, B.

RECENT DATA ON THE USE AND THE TOXICITY OF MERCURY. *(Donnees actuelles sur les utilisations et la toxicite du mercure). Text in French. Tech. Sci. Munic., 68 (4):161-171, April 1973. 13 refs.*

Current biological and toxicological data concerning mercury, mercury compounds (mercury sulfide, HgS), and principal sources of mercury contamination are reviewed. Each year 10,000 tons of Hg are used with a predicted 1.5% increase, 70% of which is not recycled. Advancements in analytical techniques has rendered Hg ubiquitous, although levels have been low except in certain aquatic organisms. Potential toxicity is increased by transformation of Hg into organomineral derivatives and high concentrations which occur in living organims. Organic Hg compounds cause acute toxic effects often described in birds poisoned by fungicides. are the reduction of egg size and prevention of hatching at 5-20 micrograms/g. Reproductive disorders result in phytoplankton and fish at concentrations of 0.1 microgram/g and 1.0 microgram/g respectively. Aquatic birds may attain concentrations of 200 micrograms/g in the liver. Human exposure to 0.5 to 1 g of Hg vapors or soluble Hg salts is possible in medical treatments, occupational surroundings, and food. Clinical, metabolic, cellular subcellular, and molecular investigations on the toxic action mechanism of Hg are discussed.

33367 **APTIC NO. 55704**

Gaskill, James R.

SMOKE HAZARDS AND THEIR MEASUREMENT. A RESEARCHER S VIEWPOINT. *J. Fire Flammability, vol. 4:279-298, Oct. 1973. 22 refs.*

Since smoke seems to be the biggest killer of persons who die in accidental fires, it is incumbent on all concerned with the fire problem to become knowledgeable in the various aspects of the hazards involved. This requires: a proper overall definition of smoke; a delineation of smoke hazards; measurement of these hazards by appropriate test methods and evaluation of the values obtained; combining the measured and evaluated values into an index that relates the particular material system to the overall smoke hazard under realistic fire conditions; and hazard evaluation and index formulation by a competent interdisciplinary committee. Granting that good fire prevention is the most effective way to eliminate smoke hazards, this approach is unlikely to be generally successful. One must therefore turn to a reasonable control of the use of materials based on their fire and smoke hazards as one alternative method. Smoke hazards discussed include opacity, lachrymatory irritation, toxicity (direct and indirect), heat, and synergism. Smoke test systems for measuring opacity, smoke standards, and experimental smoke tests are discussed. (Author abstract modified)

33368 **APTIC NO. 57070**

Guja, Antoni, Jr.

GASTRIC DISORDERS AND THE UROPEPSIN LEVEL IN PERSONS EXPOSED TO THE ACTION OF ZINC OXIDES. *(Dolegiiwosci gastryczne a poziom uropepsyny u osob narazonych na dzialanie tlenkow cynku). Wiadomosci Lekar. (Warsaw), 26(2):141-143, 1973. Translated from Polish, 4p.*

Uropepsin activity as determined by West s method was examined for 25 persons employed in zinc plants and exposed to zinc oxides. The subjects were divided into two groups: those in whom no manifest or latent symptoms of intoxication were detected, and those in whome clinically latent dysfunction of the liver was detected. No changes in activity were noted for a control group whose UP values ranged from 15-40 units. Higher values of UP were found for persons exposed to ZnO and particularly for those suffereing from latent dysfunction of the liver. Uropepsin values for the exposed subjects ranged from 20-80 units. It thus appears that routine determination of the level of urine UP of persons exposed to ZnO would be valuable diagnostic test in evaluating pathological activity of the alimentary canal.

33369 **APTIC NO. 57043**

Harada, A. and Y. Shibuya

ON THE EXAMINATION OF CADMIUM WORKERS IN A CERTAIN CADMIUM PIGMENT MANUFACTURING PLANT, 4. *(Aru kadimiumu shikiso seizo koba no kadomiumu sagyosha kenshin ni tsuite, 4). Preprint, p. 18-24, 1973. Translated from Japanese, 17p.*

Hospital test results are given for a case of chronic cadmium poisoning developed by an individual employed for 21 yrs in a Cd sintering operation, and health examination results are provided for other employees at the same Cd pigment plant. Kidney biopsy of Cd-poisoned individual showed thickening of the small arteries and a slight degeneration of the tubules, while pulmonary function tests revealed constrictive ventilatory impairment. Protein of the high globulin position type was found in the urine, and beta-2-microglobulin and vitamin A bound protein were identified in the urine protein fraction as well. An increase in urinary sugar excretion was observed despite the fact that blood sugar was normal. The examinations of other workers showed blood Cd in excess of 5 microgram/100 g for those employed in sintering and raw materials handling. There appeared to be a correlation with the exposure concentration but not with the exposure time. Eight persons were observed whose urine Cd exceeded 30 midrogram/l at least once. Urine protein disk electrophoresis patterns showed eight persons with damage to tubules, and urine lysozyme values were high for those exposed to high concentrations of Cd.

33370 **APTIC NO. 55357**

Higashida, T., M. Hashimoto, Y. Takasaka, and M. Sugiyama

PUBLIC NUISANCES AND THE HEALTH OF SCHOOLCHILDREN IN THE AREAS NEIGHBORING THE SEN-POKU SEASIDE INDUSTRIAL ZONE. *(Sen-poku rinkai kogyo chitai kinsetsu chiiki ni okeru kogai to gakudo no kenko). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10):526, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973.)*

Sixth graders in Takaishi city near the Sen-Poku seaside industrial zone were studied by questionnaires and respiratory function tests to determine the effects of air pollution on health. The reat of subjective symptoms (eye the throat irritation, cough, sputum, and asthma) was higher than that in the nationally-recognized polluted area of Osaka. The rate of lowered vital capacity increased since May 1972. More symptoms were found on students living near industiral areas. Complaints about respiratory disturbances, dust, noise, plant damage, and materials deterioration have increased in the seaside and other areas of the city.

33371 **APTIC NO. 55674**

Honma, Katsunori

STUDIES ON THE INHALATION OF HEAVY METAL AEROSOLS (II)--THE RETENTION RATE OF IRREGULARLY-SHAPED, MULTI-DIFFUSION ANTIMONY AND CADMIUM AEROSOLS IN THE LUNG. *(Jukinzoku earozoru no kyunyu ni kansuru kenkyu (2), fuseikei tabunsan anchimon oyobi kadomiumu-earozoru no hainai e no tairyuritsu). Text in Japanese. Rodo Eisei Kenkyusho Nenpo (Ann. Rept. Natl. Inst. Ind. Health), 1972:48-49, June 1973.*

As a continuation of the previous lead and tellurium aerosol lung retention test with rats, irregularly-shaped, multi-diffusion model, aerosols of antimony and cadmium were used for inhalation retention tests. An Andersen sampler was used for measuring the aerosol particle sizes, and rats were exposed to the aerosols for 90 min each. Antimony and cadmium aerosols were created by a high frequency heating fume producer; the particle distribution was within 1.6 geometrical standard errors. The relative deposition rate equaled K (a constant ratio) times the air dynamic average diameter to the -n (variable deposition coefficient). This n depended on the metal. Cadmium was close to lead and was 0.8; antimony was 1.2. With antimony, as particle sizes grew larger, the retention rate dropped drastically. The retention rate had much to do with the physiochemical properties of aerosols in addition to their aerodynamic particle diameters.

33372 **APTIC NO. 55356**

Ikeuchi, M., K. Tsukamoto, M. Ohira, and H. Aoyama

ON THE INVESTIGATION OF THE MORBIDITY OF SPECIFIED DISEASES BY MONITOR METHOD IN HIMEJI MEDICAL ASSOCIATION - YEARLY TRANSLATION DURING THE PAST 4 YEARS. *(Himejishi ishikai ni okeru monita hoshiki ni yoru tokutei shikkan no yushoritsu chosa - kako 4nenkan ni okeru nenji suii). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10):522, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973.)*

The morbidity of chronic bronchitis with cough and sputum for more than 2 months, asthmatic bronchitis with stridor but without dyspnea and cyanosis, bronchial asthma with stridor, dyspnea and cyanosis, and lung cancer were studied in Himeji city near an air pollution monitoring station. Air pollution (sulfur dioxide and floating dust) concentrations have been decreasing, while respiratory disease morbidity has been increasing except in old parts of the city. The complicated state of pollution in the Tsumashika-Shikama area suggests the necessity of studying the causes of disease with approach other than that of air pollution by SO2 and dust.

33373 **APTIC NO. 57089**

Kasperek, K., H. Schichu, A. Hoeck, V. Siller, and L. E. Feinendegen

SERUM-ZINC AS A FUNCTION OF TIME AND FOOD INTAKE. *(Serum-Zink in Abhangigkeit von der Tageszeit und Nahrungsaufnahme). Strahlentherapie (Munich), 145(2):229-233, 1973. 12 refs. Translated from German, 9p.*

The zinc serum level of 12 persons was measured by neutron activation analysis at different hours of the day and after food intake. Fasting values of Zn + or 10% of the initial value. Reproducible decreases of the Zn values were found after loading with a standardized single or double breakfast, and after six hours the decrease amounted to 30% of the initial value. The decrease in serum Zn value for normal persons after food intake was reduced with high significance by addition of 2 g of vitamin C which lessened the 6-hr reduction figure to 7-15%. These measurements prove that the values of serum Zn can only be compared under controlled conditions and definition of time and food intake. Changes in serum Zn after standardized food intake seem to be the manifestation of homeostatic control mechanisms whose changes may have diagnostic significance. (Author abstract modified)

33374 **APTIC NO. 55774**

Kawai, Kiyoyuki, Koyu Nozaki, Kazuo Fukuda, Yoshimi Matsumura, Satoko Shimizu, Yoko Kyono, and Nobuaki Miyata

EXPERIMENTS ON THE INHALATION OF HEAVY OIL COMBUSTION PRODUCTS (VI): PATHOLOGICAL OBSERVATIONS. *(Juyu nensho seiseibutsu kyunyu jikken--byorigakuteki shoken). Text in Japanese. Rodo Eisei Kenkyusho nenpo (Ann. Rept. Natl. Inst. Ind. Health), 1972: 40-41, June 1973.*

The experimental animals (rats) were dissected and pathologically examined after their natural deaths at the end of a long-term inhalation experiments of fuel oil combustion products. The animals showed a normal development in the beginning, but about the 20th week, an inhibition of weight gain began to appear in the high concentration inhalation group (particulates average concentration, 6.67 mg/cu m), the filtered smoke group (0.0.47 mg/cu m), and low concentration group (0.471 mg/cu m). In the 90-100th week, the high concentration inhalation group showed approximately 20% less weight than the control group. The survival time was 719 days for an average exposure group animal, compared to 829 days of the inhalation control group. Most causes for deaths for the exposure group before the 600th day were tumors in the pituitary gland, and after the 700th day, such old age symptoms as idiopathic nephritis, cardiofibrosis, muscle degeneration, and arteriosclerosis were the causes of deaths. In the control group, most causes of death were pituitary gland tumors, and the aged diseases did not appear until after 900 days. The difference in the survival rates among various exposure groups was not clear due to the prevalence of pituitary gland tumors. Most of lung diseases observed among the high concentration group were chronic bronchiolitis and epithelial fibrosis of peripheral bronchi. Anthracosis, inflammation of alveoli walls, and fibrosis were recognized. Anthracosis resembled its occurrence in a human being. Among the filtered smoke group, no such symptoms were noted. Most respiratory diseases were caused by the particulates in the unfiltered smoke.

33375 **APTIC NO. 55444**

Kawai, Takeshi, John Salvaggio, Pierre Arquembourg, and David Marsh

PRECIPITATING ANTIBODIES AGAINST ORGANIC DUST ANTIGENS IN HUMAN SERA BY COUNTERIMMUNOELECTROPHORESIS. *Chest, 64(4):420-426, Oct. 1973. 35 refs. (Presented at the American Academy of Allergy, Annual Meeting, 28th, San Francisco, Calif., Feb. 1972.)*

The detection of precipitating antibodies against organic dust antigens in human sera by counterimmunoelectrophoresis is described. The antibodies were determined in groups of atopic asthmatic and nonatopic normal individuals of the southern Gulf coast area. A high incidence of precipitins was demonstrated in all subject categories against ubiquitous organic dust antigens which included several house dust preparations, a locally prevalent vegetable dust, a thermophilic actinomycete, and human dandruff. Precipitins against a seasonal pollen antigen (giant ragweed) were only occasionally detected. These data provide the first evidence that antiorganic dust IgG serum precipitins are frequently present in the population at large.

These findings likely reflect the normal host response to prolonged environmental inhalant organic dust exposure. The biologic significance of antiorganic dust serum precipitins is unknown, but their presence per se cannot be considered as evidence of pulmonary disease. (Author abstract modified)

33376 **APTIC NO. 55749**

Kawaraya, T., T. Haruki, K. Tomita, and M. Oka

AMOUNT OF CARCINOGENIC HYDROCARBONS IN THE AIR OF OSAKA CITY: PART VII. STRENGTH OF TOXICITY OF CARCINOGENIC HYDROCARBONS IN THE AIR BY BIO-ASSAY. *(Osaka-shi no taikichu hatsugansei tanka suisoryo, dai 7ho; Bioassay ni yoru taikichu hatsugansei tanka suiso no dokusei kyodo). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10), 1p., 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973, Paper 566.)*

Benzene extracts of floating dusts from Osaka were studied by bio-assay on paramecium. The carcinogenic hydrocarbons benzo(a)pyrene, 1,2-benzperylene, 1,2-benzanthracene, chrysene, and corone were also tested. The effect of benzo(a)pyrene was greater with the carcinogens than by itself. All substances extracted by benzene had a larger lethal effect on the paramecium than would be expected by only benzo(a)pyrene. No seasonal difference occurred in lethal effects. The amounts of benzo(a)pyrene in the floating dust were 509 micrograms/g of tarry matter in July 1971, 753 in August, 917 in December, 784 in January 1972, 692 in July, 630 in August, and 729 in December, and 615 in January 1973.

33377 **APTIC NO. 55436**

Kesy-Dabrowska, Irena

BIOLOGICAL EFFECT OF PHOTOCHEMICAL REACTION IN PRESENCE OF CHLORINE, VAPOURS OF STYRENE, BENZENE AND ETHYLBENZENE. *(Biologiczny efekt reakcji fotochemicznych w obencnosci chloru, par styrenu, benzenu, i ethylobenzenu). Text in Polish. Roczniki Panstwowego Zakladu Higi, 24(3):337-342, 1973. 20 refs.*

The biological effect of photochemical reactions was investigated in the presence of chlorine, vapors of styrene, benzene, and ethylbenzene. The eye irritating effect was determined on human volunteers. The experiments were performed in a chamber where known concentrations of these substances in air were irradiated with light in the wavelengths from 320 to 700 nm. An indispensable conditions of the photochemical reaction was the simultaneous presence of Cl2 and styrene in air. The irritative effect of gases rose with increasing concentrations of Cl2 and styrene in the air. As a result of the photochemical reaction, the concentration of aliphatic aldehydes in the air increases. (Author summary modified)

33378 **APTIC NO. 55379**

Kilburn, Kaye H., Gerrie G. Kilburn, and James A. Merchant

BYSSINOSIS: MATTER FROM LINT TO LUNGS. *Am. J. Nursing, 73(11):1952-1956, Nov. 1973. 16 refs.*

The hazards, symptoms, and prevelance of byssinosis are reviewed. There are two main symptoms, Monday morning chest tightness and shortness of breath in workers exposed to dusts of cotton, flax, and soft hemp. Symptoms are more obvious on the first day after a rest from exposure. Recent studies suggest that irreversible airway disease occurs after less than 10 years of exposure, especially in cigarette smokers. Workers in the preparation areas of textile plants have the most symptoms and greatest decreases in expiratory flow. Forty percent of preparation workers were judged byssinotic in one mill. Yarn production workers have approximately half the prevalence observed in preparation areas, and weavers are lowest, with 6-7% affected. There was a straight line fit of the dust level and symptoms prevalence. Thus at 0.1 mg/cu m, 6.5% of workers still have symptoms. Nonsmoking cotton workers had a bronchitis prevalence of 8%, which was exceeded by the 13% in cigarette smoking wool workers. The combination of exposures to cotton and cigarette smoking raised the bronchitis rate to 28%. The American Conference of Governmental Industrial Hygienists has recommended that a safe level for respirable, lint free cotton dust should be 0.2 mg/cu m.

33379 **APTIC NO. 55398**

Konradova, V.

THE ROLE OF ULTRASTRUCTURAL CHANGES OF CILIARY BORDER IN PATHOGENESIS OF RESPIRATORY DISEASES. *(Uloha ultrastrukturalnich zmen rasinkoveho lemu v patogenezi respiracnich onemocneni). Text in Czech. Czech. Pediat., 28(2):62-65, 1973. 12 refs.*

Ultrastructural changes of the ciliary epithelium of the respiratory pathways were studied; these changes play a role in disorders of the selfcleaning abilities of the respiratory tract. In the pathologically modified mucous membranes of humans and experimental animals, extensive unevenness of the surface epithelium develops, the kinocilia being arranged in compact formations. In addition, cytoplasmic protrusions develop at the surfaces of the cells, and part of the kinocilia of individual ciliated cells are destroyed. The inhalation of compounds which temporarily stop the functioning of the cilia is followed by thickening of the external environment which surrounds the kinocilia. These changes may alter and slow the stream of mucous in the respiratory pathways, which would make the penetration of bacteria and viruses into the cells easier. It would also prolong the action of inhaled compounds on the individual cells. The time factor is of particular importance as it affects the action of irritating and potentially carcinogenic compounds.

33380 **APTIC NO. 55317**

Koshi, Kimiko, Hiroyuki Sakabe, and Kaoru Ogawa

THE CELL TOXICITY OF FUEL COMBUSTION PRODUCTS. *(Juyu nensho seiseibutsu no saibo dokusei). Text in Japanese. Rodo Eisei Kenkyusho Nenpo (Ann. Rept. Natl. Inst. Ind. Health), 1972:41-42, June 1973.*

The cytoxicity of particulate matters in fuel combustion gases on animal cells were examined. The particulates used were soot that remained in the animal exposure chambers (S-1), S-1 dialyzed in water (S-dial.), soot that remained in the flue (S-2), soot that adhered to the boiler (S-3), and S-1 suspension supernatent liquid (S-1 sup.). The amounts of soot that impaired macrophage intake of C-14 leucine 50% were 98 micrograms of S-1, 480 micrograms of S-dial., 2500 micrograms of S-2, and 2800 micrograms of S-3, and 340 micrograms of S-1 sup. The macrophage impairment is redressed when serum is added either before or after the reaction to S-1. Damages by S-1 were noted in 3T6 intake and cell degeneration. This was true even when serum was added to the culture liquid. The degree of impairment was more to less serious in the order of S-dial, S-2, and S-3. Erythrocytes also showed hemolysis in the presence of S-1 and S-dial. Soot in fuel combustion gases proved to have cytotoxicity on macrophage, 3T6 cells, and erythrocytes.

33381 **APTIC NO. 55739**

Kulikowski, J. J. and G. Leisman

THE EFFECT OF NITROUS OXIDE ON THE RELATION BETWEEN THE EVOKED POTENTIAL AND CONTRAST THRESHOLD. *Vision Res., 13(11):2079-2086, Nov. 1973. 15 refs.*

The suitability of nitrous oxide for experiments on pattern vision was studied in two human subjects. The data indicate that the inhalation of N2O does not destroy the correlation between the evoked potential and the psychophysical contrast threshold. This is in spite of the fact that the evoked potential is reduced in size and the contrast threshold is increased under these conditions. The main source of variability of the recordings under N2O are peripheral factors (e.g., variable accommodation or poor fixation). When their influence was reduced, the inhalation of N2O resulted in only slight reductions in the magnitude of the evoked potential. The late components of the evoked potential seem to reflect the process of pattern detection.

33382 **APTIC NO. 55359**

Laszt, L. and R. Schaad

EXPERIMENTS ON THE EFFECT OF EXHAUST GASES AND CARBON MONOXIDE ON THE CIRCULATION IN ANIMALS. *(Experimentelle Untersuchungen in vivo und in vitro ueber die Wirkung von Autoabgasen und Kohlenmonoxid auf den Kreislauf von Saeugetieren). Text in German. Basic Res. Cardiol., 68(4):380-394, 1973. 23 refs.*

Exhaust gases and carbon monoxide cause a 40% increase in the blood flow to the feline brain. The CO also increases by 20% the blood flow to the hind legs, while exhaust gases decrease it by 50%. Although exhaust gases and CO lower (insignificantly) the average blood pressure, the blood flow does not react accordingly, so that peripheral resistance decreases or increases according to the experimental conditions. In the rabbit, inhalation of exhaust gases produces a 40% decrease in the blood flow to the brain. This corresponds to the diminution in blood pressure and is contrary to all other measurements after inhalation of exhaust gases and CO. Thus the peripheral resistance remains unchanged. The heart rate of the cat tends to increase following the inhalation of exhaust gases and CO, but the variation is not significant; the rabbit heart rate exhibits a tendency to decrease. The respiration rate of both species remains unchanged. The diminution in peripheral resistance which follows CO inhalation is probably due to the inhibition of the vasoconstrictory nerve impulses. Exhaust gases, on the other hand, seem to directly influence the muscle cells of the blood vessels. (Author summary modified)

33383 **APTIC NO. 55610**

Lende, R. van der, B. F. Visser, and N. G. M. Orie

EPIDEMIOLOGICAL METHODS IN STUDYING CHRONIC NON-SPECIFIC LUNG DISEASE (CNSLD). *Bull. Physio-Pathol. Respir. (Nancy), 9(4):1101-1120, July/Aug. 1973. 68 refs.*

Epidemiology and epidemiological methods can contribute in several ways to the knowledge of chronic nonspecific lung disease and to the battle against it. For instance, they may provide the basic information required to take effective preventive measures. The standard questionnaire on respiratory symptoms permits effective comparative epidemiological studies. Results are reported which indicate a need for more sensitive lung function tests for use in field studies. Such tests must fulfill a number of requirements that are not necessarily applicable in clinical studies, and they must be standardized. Furthermore, methods must be found to identify people who are constitutionally sensitive to irritants, and therefore prone to disease. (Author abstract modified)

33384 **APTIC NO. 55413**

McDonald, Alison D. and J. Corbett McDonald

EPIDEMIOLOGIC SURVEILLANCE OF MESOTHELIOMA IN CANADA. *Can. Med. Assoc. J. (Toronto), 109(5):359-362, Sept. 1, 1973. 3 refs.*

The number of fatal malignant mesotheliomas occurring in Canada during the period 1960-1970 was ascertained by contacting all Canadian pathologists. The annual incidence was steady between 1966 and 1970 at 1.4 million population; and, of 71 cases registered in the period 1968-1970 and not previously reported, 66% were pleural, 24% peritoneal, and the remainder in both sites. Tumors in women accounted for 45% of the total incidence. Diagnosis of mesothelioma was approved by the Canadian Mesothelioma Panel in 59% of the cases, and 69 cases were successfully investigated epidemiologically. A history of definite or probable occupational asbestos exposure was found in 30% of the male cases as compared with 11% for controls and none for female cases or controls. Four women and one man, however, did have domestic exposure to the dusty clothing of an asbestos worker. Most of the excess occupational exposure was in the manufacture of asbestos products or insulation; little occurred in mining or milling. No case other than those resulting from occupational or domestic exposure had occurred within 20 miles of asbestos mines or mills. (Author abstract modified)

33385 **APTIC NO. 55346**

McJilton, Charles, Robert Frank, and Robert Charlson

ROLE OF RELATIVE HUMIDITY IN THE SYNERGISTIC EFFECT OF A SULFUR DIOXIDE-AEROSOL MIXTURE ON THE LUNG. *Science, 182(4111):503-504, Nov. 2, 1973. 14 refs.*

Experimental evidence concerning the physiochemical and biological factors involved in the potentiation of the irritant property of sulfur dioxide in combination with an aerosol is reported. An experiment testing the hypothesis that an elevated relative humidity, by enhancing the interaction between SO2 and certain aerosols, is important in determining whether gas/aerosol synergism occurs is described. A modification of the method of Amdur and Mead was used to measure pulmonary flow resistance (RL) in guinea pigs. Sulfur dioxide (1.1 + or 0.1 ppm), a polydispersed sodium chloride aerosol (900 to 1000 microgram/cu m), and water vapor were mixed with filtered air to provide a flow of 10 l/min, and a resistance time in the reaction chamber of about 8-10 min. Relative humidity was an important variable for those aerosols capable of absorbing water at relative humidities below 95%. (Author abstract modified)

33386 **APTIC NO. 55738**

McLaughlin, Martha, Adrian L. Linch, and Ronald D. Snee

LONGITUDINAL STUDIES OF LEAD LEVELS IN A US POPULATION. *Arch. Environ. Health, 27(5):305-311, Nov. 1973. 14 refs.*

To determine whether current levels of lead in the environment are causing any progressive changes in the blood and urine lead concentrations of the U. S. population, the blood and urine lead levels of persons living in 23 U. S. cities were monitored over a 5-year period. Urine specimens were obtained annually from 1967 through 1971 from approximately 6000 subjects, and blood specimens were obtained from 10 to 20% of these individuals. The data indicated that the blood lead levels did not increase and that the urinary lead levels decreased during the study. Analysis of quality control data, selection of data for statistical treatment, and seasonal effects did not explain the observed trend in urinary lead levels. (Author abstract)

33387 **APTIC NO. 55311**

Miyajima, F., M. Kambe, I. Kawakubo, E. Hiraoka, N. Murayama, and N. Ishikawa

RESULTS OF HEALTH INVESTIGATION ON HUMAN RESPIRATORY SYSTEM IN SHIOJIRI CITY, NAGANO PREFECTURE, PART III. THE RELATIONSHIP BETWEEN AIR POLLUTION MADE BY FACTORIES AND SYMPTOMS OF RESPIRATORY ORGANS. *(Naganoken Shiojiri-shi ni okeru kokyuki ni kansuru chosa, dai 3 po, kojo ni yoru taiki osen to jumin no kokyuki shojo tono kanren ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10):517, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973.)*

Morbidity, respiratory disease symptoms and sputum amounts were greater for people living in industrial areas than for those living in agricultural areas. Dust fall averaged 6700 kg/sq km/mo in the city and 26,300 in the industrial area. The dust consisted mainly of silica and alumina. Sulfur dioxide concentrations decreased with distance from the factory. Health effects were due to SO2 and nitrogen dioxide. Respiratory disease morbidity was also a function of distance from the factory. Morbidity of coughing and sputum which continued for more than 3 mo was higher with closeness to the factory. After correction for smoking and age, morbidity equaled 12.706 0.013 times the distance. The frequency of sputum of more than 1 ml increased as the distance to the factory decreased. Sputum frequency decreased from 1970 to 1972 in both the agricultural and the industrial areas.

33388 APTIC NO. 55750

Mizoguchi, I., K. Makino, Y. Sato, S. Osawa, and H. Yagyu

RESULTS OF THE INVESTIGATION OF SUBJECTIVE SYMPTOMS CONCERNING PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu ni kansuru jikakusho chosa ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10), 1p., 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973, Paper 526.)*

Symptoms occurring during July to Oct. 1972 on children in Tokyo were studied. Photochemical smog symptoms were caused by oxidants, sulfur dioxide, nitrogen oxides, and dusts and included eye irritation, throat irritation, cough, sputum, fatigue, headache, and nose congestion. The various symptoms were correlated to concentrations of the various pollutants, temperature, and relative humidity. Numbness, dizziness, convulsions, and nausea had no correlation. Frequency of complaints were in the following order: eye irritation, headache, cough, throat irritation, sniveling, stopping up of nose, odor, sputum, feeling sick, gasp, fatigue, lachrymation, and fever.

33389 APTIC NO. 55752

Murayama, N. and Y. Nakagawa

AIR POLLUTION AND ITS INFLUENCE OF THE INHABITANTS HEALTH AROUND A GRINDING MATERIALS FACTORY. *(Bo-kensakuzai kojo shuhen ni okeru taiki osen to jumin no kenko). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10), 1p., 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973, Paper 551.)*

Residents of an area near a grinding material factory were studied to determine effects of air pollution. Questionnaires show complaints by 15% suffering from ill health, 19% in moderate health, 6% with bronchial disease, 4% with upper respiratory disease, 10% with respiratory diseases, 8% with circulatory diseases, 5% motor system diseases, and 3% digestive system diseases. Bronchitis occurred more frequently in older persons and persons who resided for a long time in the area. Thirty percent of the inhabitants caught cold more than six times a year. Sulfur oxides, nitrogen oxides, chlorides, and dusts increased with nearness to the factory. Subjective symptoms, medical examination results of 262 inhabitants of 102 households, chemical composition of falling dust, and morbidity of respiratory diseases are described. Air pollution due to the grinding materials caused frequent occurrence of respiratory disease symptoms.

33390 APTIC NO. 57017

Nagaoka, S.

CLINICAL RESEARCH FOR HEALTH EFFECTS OF AIR POLLUTION. *Tokyo-To Kogai Kenkyusho-ho (Ann. Rept. Tokyo Metropol. Res. Inst. Environ. Protection) 1973. Translated from Japanese, p. 86-91.*

A review of research reports is presented on immuno-chemical research on effects of air pollution, the effects of air pollution on upper airways, and the relationship between air pollution and children s bronchial asthma. Measurements of alpha1-antitrypsin in the blood of patients suffering from chronic obstructive lung disease have revealed no correlation between this blood parameter and susceptibility to the influence of air pollution. The possibility that lung tissue itself will undergo degeneration and act as a foreign body when gaseous air pollutants are inhaled was studied by exposing rats to 500 ppm of sulfur dioxide, extracting and homogenizing the lungs, and injecting the lung emulsion into other rats; the results of the tests were negative. Investigations of the effects of air pollution on upper airways have shown no pathological relationship between cysts which are sometimes observed in the vicinity of the epiglottis and air pollution. Autopsies on silicosis patients coincide with animal experiment findings that indicate the trachea, rather than the larynx, if affected as a result of exposure to dust or silica. Pulmonary function tests on grade schoolchildren in Tokyo have implied a probable connection between air pollution and some form of latent constriction of the airway, though strict comparative studies on the degree of air pollution at these locations and times have not been made.

33391 APTIC NO. 55310

Nakajo, E. and B. Tachibana

INFLUENCE OF AIR POLLUTION ON THE HEALTH OF RESIDENTS. *(Taiki osen ga chiiki jumin no kenko ni oyobosu eikyo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10):525, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973.)*

Residents of and commuters to Fukushima in Osaka which neighbors on a nationally recognized pollued area and a national highway were studied by questionnaires. Cough and sputum morbidity was 11.1% in men, 6.0% in women, 10.2% in residents, and 4.3% in commuters. The morbidity was highest in the area near the national highway (17.6%), followed by that in the industrial section (10.9%), and then that in the residential and commercial area. The percentage of complaints was highest among residents who live along the highway. Cough and sputum may be caused by the exhausted automobile emissions. Respiratory system diseases, cardiovascular diseases, smoking, and occupation were also noted.

33392 APTIC NO. 55697

Niklowitz, Werner J. and David W. Yeager

INTERFERENCE OF PB WITH ESSENTIAL BRAIN TISSUE CU, FE, AND ZN AS MAIN DETERMINANT IN EXPERIMENTAL TETRAETHYL LEAD ENCEPHALOPATHY. *Life. Sci., 13(7):897-905, 1973. 21 refs.*

The interaction of lead with essential trace metals was investigated to determine the content of copper, iron, zinc, and Pb in selected areas of the brain of control rabbits and rabbits exposed to tetraethyl lead (TEL). To induce TEL poisoning, the rabbits were given a single intraperitoneal injection of TEL at a dose of 100 mg/kg. The animals were decapitated and the frontal cortex without bulbus and tractus olfactorius, cerebellum without vermis, and hippocampus without fimbria, were removed for metal analysis. Each analyzed brain area contained approximately 33 micrograms of Pb/g of dry weight. At the same time, there was a statistically significant loss in the same brain areas of the essential elements Cu, Fe, and Zn. While the molar ratio between gain of Pb and decrease of Cu revealed an approximate proportionality of 1:1, the ratio between Pb and Fe was approximately 1:2. The decrease of Zn levels varied in these brain areas and was lowest in the inferior hippocampus. The potentiality of an interference of Pb with essential trace metals of the brain, preferentially with the metal group of metalloenzymes, as the primary and dominant mechanism of the toxid action of Pb in Pb encephalopathy, is discussed. (Author abstract modified)

33393 **APTIC NO. 55332**

Nozaki, Koyu, Kiyoyuki Kawai, Kazuo Fukuda, Yoshimi Matsumura, and Nobuaki Miyata

EXPERIMENTS ON THE LONG-TERM INHALATION OF THE COMBUSTION PRODUCTS OF HEAVY OIL. (V): INHALATION APPARATUS AND ENVIRONMENTAL CONDITIONS. *(Juyu nensho seiseibutsu chokikyunyu jikken. 5, kyunyu sochi narabini kankyo joken ni tsuite). Text in Japanese. Rodo Eisei Kenkyusho Nenpo (Ann. Rept. Natl. Inst. Ind. Health), 1972:39-40, June 1973.*

In the long-term inhalation test of fuel oil combustion products, exposure groups were divided into a high concentration group, which inhaled the total smoke and particulates, a filtered smoke group which inhaled smoke without particulates, and a low concentration group which was exposed to 500 micrograms/cu m of total smoke with particulates. The inhalation control group was exposed to the normal air of the lab, and the complete control group was raised in a regular animal rearing chamber. The environmental conditions in the exposure chambers were monitored every 2.5 min by a light scattering particulate meter and hourly averages were obtained from the readings for every 15 min. The total measurements of 24 months (105 weeks) for the low concentration group and high concentration group were 470 micrograms/cu m and 6.7 mg/cu m respectively. For the high concentration group, 85% of the time the smoke concentration was less than 10 mg/cu m. The room temperature, humidity, ventilation were strictly regulated to the optimum conditions, in order to prevent early deaths of experimental animals from infectious complications of the respiratory system. Pneumonia, which had been the serious problem of previous experiments were succesfully arrested in this experiment. The 24-month survival rates for the inhalation group, inhalation control group, and the regular rearing box group were 70%, 79% and 85% respectively, and the 30-month survival rates were 7%, 44%, and 79% respectively.

33394 **APTIC NO. 55751**

Oda, H., S. Kusumoto, and T. Nakajima

THE DETECTION OF NO-HEMOGLOBIN BY THE ELECTRON SPIN RESONANCE METHOD. *(NO hemogurobin no denshi supin kyomeiho ni yoru kenshutsu ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10), 1p., 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973, Paper 553.)*

Mice were exposed to nitrogen dioxide, and nitric oxide-hemoglobin was detected in their blood by electron spin resonance (ESR) spectrometry. Rats and rabbits were exposed to nitric oxide, and the oxygen-dissociation curve was obtained. Since mice and rats had NO-hemoglobin without any treatment with sodium sulfate and since rabbits did not show the NO-hemoglobin after treatment, the formation of NO-hemoglobin may be species specific. The rabbit s blood had hemoglobin with a stronger affinity to oxygen than the mice s blood, and thus NO-hemoglobin formation was suppressed in rabbits. When nitrite was added to a solution of erythrocytes, formation of NO-hemoglobin was less in rabbits than in mice. The enzyme activity in erythrocytes also relates to species specificity of NO-hemoglobin formation.

33395 **APTIC NO. 55361**

Oi, Gen

DISCHARGED GASES FROM AUTOMOBILES AND LEAD POISON. *(Jidosha no haiki gasu to namari chudoku). Text in Japanese. Kankyo Hakai (Environ. Destr.), 4(8):50-54, Aug. 1973.*

Lead is emitted by automobiles and airplanes. Blood lead content in humans has been steadily increasing due to this emission. Although lead is toxic, little is known about its effects prior to the disease stage. The lead content in permanent Greenland snow was 0.7 mg 30 years ago and is now 2.2 mg. Air lead concentration was 0.67 micrograms/cu m in Tokyo in 1970 and 2.85 micrograms/cu m in a large city in the U. S. It is believed that concentrations of 150-200 micrograms of lead/cu m of air are safe, but the possibility remains that a lower concentration may be causing undetected effects. The delta-aminolevulinic dehydrogenase enzyme s activity is strongly dependent on the blood lead concentration and may be used as an indicator of lead exposure. Shoeshine boys and highway maintenance employees who work near busy streets did not show high blood lead contents, however.

33396 **APTIC NO. 55414**

Opletal, A., E. Cerny, and A. Mozna

THE EFFECT OF PASSIVE SMOKING ON THE MUCOUS MEMBRANE OF RESPIRATORY PATHWAYS IN EXPERIMENT (SECOND PART). *(Vliv pasivniho koureni na sliznici dychacich cest v experimentu (druha cast)). Text in Czech. Cesk. Otolaryngol., 22(2):65-67, 68, 1973. 3 refs.*

Histological and histochemical methods were used to evaluate the effects of passive smoking on the mucous membranes of the respiratory pathways of 29 guinea pigs. The results indicated a fluctuation in enzyme activity, and morphological changes in the superficial epithelium proved to be identical with those of a long-term experiment.

33397 **APTIC NO. 55670**

Oshima, Hidehiko

DISEASES DUE TO AIR POLLUTION. *(Taiki osen kei shikkan). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10):72-73, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, 1973.)*

Attacks of bronchial asthma in Yokkaichi are directly related to the aerial concentration of sulfur dioxide. The morbidity of bronchial asthma was 2.3%, excluding infantile asthma, and occurred in 10% of the population over 50. Other diseases occurring frequently in air polluted areas are disorders of the upper airway, colds, anterior ocular disease, chronic bronchitis, and obstruction. The morbidity of bronchial asthma increased four-fold since the installation of industry in the area. Slight improvements have been noted in the incidence of chronic bronchitis and asthma since pollution control measures have been instituted in heavily polluted areas, but in less polluted areas the ratio has not changed. The whole amounts of SO2 should be regulated. Concentration of SO2 is also related to the morbidity of chronic bronchitis in people over 40 and in schoolchildren.

33398 **APTIC NO. 57057**

Otto, H. F.

ON THE FUNCTIONAL SIGNIFICANCE OF INTESTINAL PANETH CELLS. *(Zur funktionellen Bedeutung der intestinalen Paneth-Zellen). Deut. Med. Wochenschr., vol. 98:220-226, 1973. 87 refs. Translated from German, 23p.*

A review of the literature on the functional significance of intestinal Paneth cells is presented. Paneth cells are secretorily active cells located in the fundus of the Lieberkuhn crypts in the small intestine and contain numerous oxyphile granules that are continuously extruded onto the lumen between crypts. The hypotheses advanced so far regarding their function are: heavy metal elimination of such elements as calcium, zinc, cobalt, mercury, and lead; acid regulation; cholesterin absorption; nutritional function; enzyme secretion; and lysozyme activity. The idea of heavy metal elimination has been repeatedly considered on the basis of predominantly experimental research. The presence of zinc sulfide in the granules secreted by the cells has been shown following experimental Zn poisoning, and elimination of Zn through the small intestine has been postulated following experimental animal studies. Electron microscope studies have shown protein-bound heavy metals in the secreted granules from Paneth cells in laboratory animals, though detection of heavy metals by the silver sulfide reaction has been negative for man. Each of the other above-mentioned hypotheses regarding the function of Paneth cells is also discussed in detail.

33399 **APTIC NO. 55733**

Perret, Cl.

THE PHYSIOPATHOLOGY AND TREATMENT OF CARBON MONOXIDE POISONINGS. *(Physiopathologie et traitement de l intoxication au monoxyde de carbone). Text in French. Schweiz. Med. Wochenschr., 103(33):1161-1166, Aug. 18, 1973. 13 refs.*

The physiopathology and treatment of carbon monoxide poisonings are discussed based on literature and studies, including a clinical study conducted in 1964 on 36, 16 to 90 year old patients poisoned with carbon monoxide. Out of the 36, 20 patients were treated by conventional oxygenotherapy, and 16 by hyperbaric oxygenotherapy. Two of the patients died, i.e., 5.5% of the total patients, due to progressive and irreversible respiratory failure secondary to aspiration pneumonitis. All the other patients recovered uneventfully. Carbon monoxide intoxication interferes with the tissue oxygen supply in various ways: decrease of available hemoglobin, alteration of the oxygen dissociation curve, and inhibition of cell respiration after fixation upon myoglobin and the cytochromes. In severe intoxication, cell anoxia develops and induces lactic acidosis. The effects of simple oxygen therapy, carbogen, and hyperbaric oxygen are discussed. Inhalation of carbogen comprising 95% oxygen and 5% carbon dioxide is superior to simple oxygen therapy. Hyperbaric oxygen therapy consists of inhaling a mixture of carbon dioxide and oxygen at high pressures. The advantages of the hyperbaric oxygen therapy were demonstrated by the spectacular recovery of a 69 year old depressive poisoned with exhaust fumes from his car. After regaining consciousness, no aftereffects could be observed. A similar recovery was noted in the case of a 49 year old female suicide. All clinic cases presented demonstrate the advantages of hyperbaric oxygen.

33400 **APTIC NO. 55703**

Petering, Harold G., David W. Yeager, and Sylan O. Witherup

TRACE METAL CONTENT OF HAIR: II. CADMIUM AND LEAD OF HUMAN HAIR IN RELATION TO AGE AND SEX. *Arch. Environ. Health, 27(5):327-330, Nov. 1973. 10 refs.*

The cadmium and lead concentrations in the hair of male and female humans were age dependent. Cadmium in the hair of the males increased with age to the twentieth year and probably remained at an elevated level or decreased slightly thereafter. Cadmium in the hair of the females increased from the fourteenth year (earliest age measured) to a peak between 40 and 50 years of age; thereafter the value remained high. Lead in the hair of the males gradually declined from a high value of 25 ppm at 2 years of age to a low value of about 10 ppm at age 85. In the females, the hair lead rose sharply from a low of 4 ppm at 14 years of age to a peak value of about 40 ppm at 35 years, it then decreased sharply to a low of 2 ppm at 84 years. In male hair, the concentration of zinc is related to that of copper and lead, copper is associated with cadmium, and cadmium and lead show a high degree of correlation. In female hair, copper and cadmium are correlated, as are cadmium and lead. These differences probably indicate differences between the sexes in their metabolism of these metals. The high levels of lead in the hair of the children suggests that they are being subjected to unsuspected exposures, perhaps even in utero. The subjects were from urban Cincinnati.

33401 **APTIC NO. 55602**

Picko, V.

A STUDY OF ENVIRONMENTAL POLLUTION EFFECTS ON GENERAL HEALTH OF THE POPULATION. *(Studium ovlivneni zdravotniho stave obyvatelstva znecistenym prostredim). Text in Czech. Cesk. Pediat. (Prague), 28(1):29-30, 1973. 4 refs.*

The effects of life in a polluted environment were compared with those in an unpolluted environment by statistical evaluation of the number of visits to physicians by children living in five polluted (industrial) and in five unpolluted (non industrial) cities of northern Bohemia. The study was based on the assumption that life in a polluted environment would force a more frequent number of visits to doctors by children as a susceptible population age group; to exclude insignificant variations, differences between the two groups would have to be bigger than those within the groups. Results confirmed the validity of this assumption at the 1% level of statistical significance for all four climatologically different trimesters calculated separately. Of the five polluted localities, all coal mining towns, the city of Most had by far the highest incidence of child morbidity.

33402 **APTIC NO. 55608**

Rufener-Press, C., P. Rey, and P. Press

AN EPIDEMIOLOGIC STUDY ON CHRONIC BRONCHITIS IN A SAMPLE OF THE ACTIVE POPULATION OF GENEVA. *(Une etude epidemiologique de la bronchite chronique a Geneve. Prevalence des symptomes respiratoires et resultats de mensurations fonctionnelles dans un echantillon des la population active). Text in French. Respiration, 30(5):458-516, 1973. 78 refs.*

The incidence of chronic bronchitis among 1681 males and 1201 females in Geneva was determined. The subjects filled out questionnaires, and the following functions were measured: peak flow rate (PFR); forced expiratory volume in 1 second (FEV1); forced expiratory volume in 3 seconds (FEV3); and vital capacity. The sample was representative of industry, business, and administration, and contained a representative proportion of skilled and unskilled workers, technical employees, and executives. The sample was divided into three groups: a healthy group with no respiratory symptoms; a group which had respiratory symptoms but did not fit the definition of chronic bronchitis; and a group which had respiratory symptoms and fit the definition of chronic bronchitis. The data indicate that: chronic bronchitis does not result from the aggravation or isolated or combined respiratory symptoms; chronic bronchitis is a disease which appears mostly in sensitive subjects with previous chest impairment; chronic bronchitis is characterized by the development of an obstructive syndrome which is accompanied by a progressive impairment of the respiratory function; and the evolution of chronic bronchitis is independent of external factors. Smoking was a major factor. (Author abstract)

33403 **APTIC NO. 57055**

Schlipkoeter, H. W.

CLOSING REMARKS FOR THE HEAVY METAL COLLOQUIUM, 22/23 FEBRUARY 1973. *Preprint, 9p., 1973. (Presented at the Engineering Association International Meeting, Duesseldorf, West Germany, Feb. 22-23, 1973.) Translated from German, 9p.*

A summary of presentations relating to the heavy metals lead, zinc, and cadmium is given. Increases from the normal soil and vegetation lead content of 2-10 mg/kg to 100 mg/kg along highways, and to significantly higher values in the immediate vicinity of lead emitters, indicate the extent of emission hazards present. Zinc content of soil near industrial plants has been observed as high as 7500 ppm, and Cd content has been found to increase from 0.2-2 mg in soil and 0.5 to 1 mg/kg in plants. near industrial facilities cadmium may increase by factors of 70-100. Zinc and Pb have been shown to have a phytotoxic effect, expecially upon vegetables; and plants damaged by sulfur-containing emissions are more seriously damaged in heavy metal containing soils. The Pb, Zn, and Cd content of feed is dominant for domestic animals; and the Pb and Cd tend to accumulate in the animal organism. Differences in sensitivity of individuals in a total population, especially for children, appear to hold for Pb; the amount of Pb incorporated through breathing has been evaluated as twice as high for children as for adults. A Pb content of 3 microgram/cu m in inhaled air has been found to increase the blood Pb level by 5% microgram. While Zn is an essential trace element for the human organism, the knowledge of Zn resorption and enrichment in various organs is still incomplete. Zinc intakes of 400 mg/day can lead to bone damage, and 150 mg/day cause nausea in man. Cadmium elimination is very low (1 microgram/day) due to the combination of this non-essential metal with proteins, and in keeping with its significance a maximum emission concentration value of below 0.05 microgram/cu m is recommended.

33404 **APTIC NO. 55309**

Shibuya, O., K. Matsunaga, Y. Chiba, K. Momozaki, A. Imabori, M. Chiba, and T. Tsunoda

INFLUENCE OF AIR POLLUTION ON THE HEALTH OF INHABITANTS IN A MIDDLE SCALE CITY, PART III. HEALTH EXAMINATION OF THE INHABITANTS. *(Chusho-toshi ni okeru taiki osen no jumin no kenko ni ataeru eikyo, sono 3, jumin no kenko shindan). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10):516, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973.)*

Fifth graders in Soka city and their mothers were studied at a school where many children had asthma and asthma-like diseases and at another school with a small number of diseased children. Questionnaires, urinalysis, blood examinations, respiratory function tests, blood pressure, and other tests were conducted. Hemoglobin and hematocrit measurements were the same in children from the different schools. Delta-aminolevulinic acid dehydrogenase was also the same. Only two boys in the school with less respiratory diseases had protein in their urine. Mothers had no differences in hemoglobin and hematocrit %, but the two values were less than the standard. No differences occurred in the mothers delta-aminolevulinic acid dehydrogenase. Blood pressures in the mothers were 116-68 and 117-70 mm Hg, respectively. Pulmonary function (vital capacity, ventilation, etc.) were also the same in the mothers.

33405 **APTIC NO. 55358**

Shimizu, T., Y. Tsunetoshi, M. Ueda, and N. Nakayama

ON THE INFLUENCE OF AIR POLLUTION TO THE HEALTH STATE OF SCHOOLCHILDREN, CENTERING TO THE RESPIRATORY FUNCTION. *(Osen chiku no gakudo no kenko ni oyobosu eikyo ni tsuite-kokyu kino o chushin ni shite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10):512, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973.)*

Schoolchildren in Osaka were studied by questionnaires and examinations to determine the effects of air pollution on respiratory function and asthma. Boys and girls in the industrial area of Nishiyodogawa-ku, Osaka, had 2.1% and 1.5% asthma, and 3.2% and 1.7% asthmatic bronchitis, respectively. Children who exhibited asthmatic symptoms were studied and found to have obstructive disease frequencies of 27% in the dyspnea complaining group (asthma), 26.1% in the stridor-complaining group (asthmatic bronchitis), 14% in the group with a history of disease and existing cough, and 17.7% in the group having only a history of disease. The frequency in children in general was only 8%. Children studied two years later had 57.6% dyspnea symptoms with obstructive disturbance and 18.2% stridor symptoms, contrasted with 31.5% dyspnea with normal respiratory function and 13.8% stridor on the second investigation. This showed the continuation of symptoms in the group with obstructive disturbances. The growth of children was lower in the dyspnea group than in the group with only a disease history; the increase of forced vital capacity versus the increase of body height had the same trend. Asthmatic children had lower respiratory functions even in the intermittent period without asthmatic attacks; the prognosis of having symptoms was worse in the group with obstructive disturbances in the respiratory function test.

33406 **APTIC NO. 55420**

Smulevich, V. B., A. I. Vaisman, and M. Sh. Ixanov

DISABILITY DUE TO NEOPLASMS IN DRIVERS. *(Invalidnost, obuslovlennaya novoobrazovaniyami, u voditeley avtomobiley). Text in Russian. Vopr. Onkol., 19(9):57-61, 1973. 17 refs.*

Disability and morbidity in professional drivers due to neoplasms (tumors) and chronic inflammatory processes is evaluated on the basis of medical reports on professional drivers in Moscow and Gorkiy, covering periods of 7 and 4 years, respectively. Disability due to neoplasms was determined to be 15.7% in Gorkiy, and 9.6% in Moscow, significantly higher than in a control male population. Rapid increase in the incidence of neoplasms with age, and especially with the length of service, was observed among drivers. The incidences of malignant neoplasms of the stomach, respiratory organs, and hemopoietic organs and the lymphatic system were 47.3%, 27.3%, and 7.3%, respectively. The incidence of benign neoplasms was 0.9%. The incidence of chronic bronchitis among drivers was 5.3%. The high incidence of malignant neoplasms in drivers is attributable to irregular meals, smoking, and air pollution in driver's compartments. The incidence of neoplasms and respiratory disease was lower in chauffeurs and cab drivers than in truck drivers and bus drivers, who are exposed to higher air pollution.

33407 **APTIC NO. 55661**

Suzuki, Yasuo, Takashi Suzuki, Hideaki Kikuchi, Shigeki Asada, Mitsuhisa Ono, Mitsuru Uchiyama, and Takashi Suzuki

THE EFFECTS OF AIR POLLUTION ON THE HUMAN BODY. *(Taiki osen no jintai eikyo chosa). Text in Japanese. Preprint, Pharmaceutical Society (Japan), Sendai, p. 22, 1973. (Presented at the Pharmaceutical Society, Annual Meeting, 13th, Sendai, Japan, Oct. 28, 1973.)*

Miyagi Prefecture policemen in various duty categories were given health examinations to see the effects of air pollution on the urine lead content and the carbon monoxide saturation in blood. The carboxyhemoglobin levels were measured before the policemen went to work and after they returned. The Pb average of 72 policemen was 7.8 to 97.2 micrograms/l. The average was 21.6 for urine from a normal night and in the urine with Pb discharge agent was 28.4 micrograms/l, ranging from 11.5 to 114.5. There was no significant difference by duty categories. The HbCo average also showed no significant difference by duty categories, but showed a strong correlation with the smoking quantity.

33408 **APTIC NO. 55369**

Tomita, Kinuko

CARCINOGENIC HYDROCARBONS IN THE ENVIRONMENTAL AIR. *(Kankyo kukichu no hatsuganse tanka suiso). Text in Japanese. Seikatsu Eisei (J. Urban Living Health Assoc.), 17(4):100-112, April 1973. 49 refs.*

The formation and cancer activities of hydrocarbons and their distribution and measurement methods are reviewed. Some hydrocarbons are released from petroleum or coal when heated to a certain temperature with little or no change in the chemical composition; others become free radicals or low molecular hydrocarbons by pyrolysis and become multinuclear by bonding with other elements. Among this latter group, tar formed from the pyrolysis of acetylene or isoprene at 700-900 C is strongly carcinogenic. Various theories try to explain the structure and carcinogenic activities; some consider that the double bonding location (Krebs-region) of phenanthrene has something to do with cancer; some others feel that the relationship or protein energy area and electron energy of the carcinogen is a factor. A Japanese scientist suspected the hydrocarbon electron excitation and the activities of carcinogens, and after examining the electron absorption belts of 42 hydrocarbons and carcinogenic activities, found that all 13 HC known as carcinogens had the maximum frequency absorption belt in the alpha area, and that those in the p area were not carcinogenic. The measurement and analysis methods of environmental HC are discussed.

33409 **APTIC NO. 55363**

Toyama, T.

REPORT ON THE SPECIAL EXAMINATION CONCERNING PUBLIC DAMAGES DUE TO AIR POLLUTION. *(Taiki osen kogai tokubetsu kenko shindan kekka hokokusho). Text in Japanese. Keio Univ., Tokyo (Japan), School of Hygiene, 79p., April 1973.*

Policemen exposed to automobile exhausts were studied by questionnaires, respiratory function tests, determinations of carbon monoxide in expired air, survey of fatigue, and examination of blood specific gravity and carboxyhemoglobin. Respiratory disease morbidity varied according to police station, age, duties, and other factors, however respiratory disease symptoms such as sputum, rhinitis, and gasp were conspicuously noticed in every classification; these symptoms were more serious in smokers; no residential difference regarding air pollution was found. Eye and respiratory disease morbidities correlated with air pollution concentration. Respiratory function had no significance. Carboxyhemoglobin was higher for outdoor workers, even in nonsmokers, especially in areas with high automobile densities. The highest fatigue was physical, then psychoneural, and then visual and auditory; there was no correlation between fatigue and CO concentration in expired air. Blood specific gravity was 1.058 on the average, compared to 1.057-1.058 in general workers. Carboxyhemoglobin percentage correlated with CO in expired air. Air pollution therefore affected the policemen, especially older policemen. Fatigue was conspicuous in persons over 30 years old and in policemen with outdoor duty. Improved working conditions and facilities are needed to protect policemen from air pollution.

33410 **APTIC NO. 55377**

Toyoshima, Kyoichiro

HOUSE DUSTS. *(Kaokujin ni tsuite). Text in Japanese. Arerugi Dokokai-shi (J. Assoc. Stud. Allergy), no. 2:55-69, March 1973.*

House dusts of a bronchial asthmatic patient s house were collected by vacuum cleaner; allergens were extracted, refined, and tested on bronchial asthmatic patients. Allergens were extracted by first removing from the dusts by ether, then by drying, weighing, extracting by a phosphoric acid buffer, filtering, dialyzing, membrane filtering, freezing, and drying. The 0.002% solution was further diluted by 1000 times. This extract, 0.025 ml (0.5 micrograms), was hypodermically injected into patients who were allergic to house dusts, and positive red rash reactions were confirmed. Then, 164 bronchial asthmatic patients (115 male, 49 female) were given the same injection and 75% reacted positively, (77% male, 71 female). Store-bought house dust extract was injected and only 29% of the same group reacted positively. Among non-allergic persons, only 4% reacted to the specially prepared house dust extract and none reacted to the store-bought extract. This allergen extract had approximately 30-90 times the hypodermic activity of a store-bought allergen extract. The cause for the difference in the activities is not known; but some scientists have reported that the dusts from patients homes have more allergen activities than dusts from normal households. Others say that the season has much to do with the allergen activity of dusts. The extract was analyzed by gas chromatography, and hypodermic reaction to each partition, threshold for each partition, and activity indexes were examined on patients.

33411 **APTIC NO. 55326**

Turner-Warwick, M.

IMMUNOLOGY AND ASBESTOSIS. *Proc. Roy. Soc. Med., 66(9):927-930, Sept. 1973. 12 refs.*

The prevalence of antinuclear antibodies and rheumatoid factors was studied with three series of subjects exposed to asbestos dust under different conditions. A greater incidence of ANA and rheumatoid factors was found in the Pneumoconiosis Medical Panel series, where the majority of subjects had abnormal chest radiographs, in contrast to a near normal incidence in the East Ham and Medical Research Unit series, where the majority of subjects had no clinical or radiographic evidence of asbestos induced lung disease. The evidence thus suggests that the development of autoantibodies is related to asbestosis and not to heavy exposure alone. (Author summary modified)

33412 **APTIC NO. 57021**

Valchuk, N. K. and N. P. Shramko

THE EFFECT OF SMALL ADDITIONS OF MOLYBDENUM ON THE ORGANISM DURING LONG TERM EXPOSURE TO IT. *(O vliyanni na organizm malykh dobavok molibdena pri dlitel nom yego vozdeystivii). Gigiena i Sanit., vol. 38:107-108, Feb. 1973. Translated from Russian, 5p.*

Molybdenum in the form of a solution of ammonium molybdate was orally administered to seven groups of six rabbits in a one year chronic experiment in an attempt to define the role of the element in metabolic processes and to investigate deposition levels and histomorphological changes in the kidneys, spleen, and liver. A control group received a standard daily amount in their drinking water, while the remaining groups received additional daily amounts ranging from 25 micrograms/kg to 5 micrograms/kg. Autopsy was performed after one year, trace element content of the organs was determined by a photoelectrocolorimetric method, and the results were subjected to statistical processing. The amount of Mo in the organs of the test animals underwent a statistically reliable increase in comparison with the control group; hence, even small additions of the element appear to lead to deposition in the organs. Additional administration of Mo into the organism in an amount ranging from 25 to 1000 microgram/kg did not cause morphological changes in the kidneys, livers, or spleens. Administration of Mo in the amount of 5 micrograms/kg did, however, cause disorders of the metabolic processes in the kidneys which were characterized by plethora, swelling, and increase in the number of nuclei in the vascular glomerulus, and development of granular distrophy in the epithelium of the convuluted canaliculi. Metabolic disorders also appeared in the hepatic tissues and were accompanied by granular distrophy. The granular distrophy in the majority of cases was combined with focal, fine-drop lipide distrophy. No changes were detected in the spleen.

33413 **APTIC NO. 55748**

Wakizaka, Ichiro

EXPERIMENTAL RESULTS ON THE REPEATED EXPOSURE OF MICE TO CO. *(Issanka-tanso no kanketsu bakuro jikken). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10), 1p., 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973, Paper 567.)*

Mice were exposed continuously and repeatedly to carbon monoxide for 1 hr at 1600 ppm, 2 hr at 800 ppm, 4 hr at 400 ppm, 8 hr at 200 ppm, and 24 hr at 100 ppm every day for more than 80 days. After 1 mo, hematocrit increased, hemoglobin increased, and the 100 ppm group had 9% carboxyhemoglobin. The mice exposed continuously to 100 ppm had constriction of the spleen. The mice exposed intermittently had constriction or pypertrophy. No differences occurred in oxygen consumption. Mice exposed to 1600 ppm for 1 hr/day had no increase in body weight, had increased hematocrit % and hemoglobin at the end of the first week, had level hematocrit and hemoglobin values for 2 mo, and had decreasing hematocrit and hemoglobin thereafter until at the end of the experiment when they reached the same level as the control animals. Long intermittent CO exposure induced failure of the compensation of the lowering of the blood-making function.

33414 **APTIC NO. 55695**

Waterfall, John F. and Peter Sims

THE METABOLISM OF DIBENZO(A,H)PYRENE AND DIBENZO(A,I)PYRENE AND RELATED COMPOUNDS BY LIVER PREPARATIONS AND THEIR ENZYME-INDUCED BINDING TO CELLULAR MACROMOLECULES. *Biochem. Parmacol., vol. 22:2469-2483, 1973. 33 refs.*

The metabolism of dibenzo(a,h)pyrene and dibenzo(a,i)pyrene and related compounds by liver preparations was investigated, and their enzyme induced binding to cellular macromolecules are described. The pyrenes were metabolized to unidentified phenols and dihydrodiols by homogenates and microsomal fractions from the livers of rats that had been pretreated with 3-methylcholanthrene. In comparative experiments in which the two 3H-labeled dibenzopyrenes and 3H-labeled benzo(a)pyrene were metabolized by microsomal fractions from the livers of normal rats, mice, hamsters, and guinea pigs, the dihydrodiols formed initially by the fractions from guinea pigs, and to a lesser extent those formed by fractions from hamsters were further metabolized to unidentified products. Further metabolism of the dihydrodiols formed by mcirosomal fractions from the liver of rats and mice did not occur. Higher levels of enzyme-induced binding of all three hydrocarbons to the microsomal proteins were found in the preparations from guinea pig livers than in the preparations from the livers of animals of the species, and in all preparations maximum levels of binding were reached after 30 min incubation. Enzyme-induced binding of the two dibenzopyrenes to deoxyribonucleic acid (DNA) was observed when the 3H-labeled hydrocarbons and DNA were incubated with microsomal fractions from the livers of rats that had been pretreated with 3-methylcholanthrene, but the levels of binding were low compared with those obtained with dibenzo(a,h)anthracene. (Author abstract modified)

33415 **APTIC NO. 55312**

Yoshida, R., K. Motomiya, M. Adachi, and K. Hayashi

RESULTS OF MORBIDITY INVESTIGATION OF RESPIRATORY DISEASES SYMPTOMS IN THE INHABITANTS IN SHIMIZU CITY. *(Shimizu-shi ni okeru kokyuki shojo yushoritsu chosa). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10):520, Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Oct. 1973.)*

The morbidity of respiratory disease symptoms in inhabitants of Shimizu City older than 40 was investigated using questionnaires. Generally, there was no difference of morbidity between men and women, however the morbidity became higher as the age became greater, especially in symptoms such as cough, sputum, and gasp. When the city was divided into three sections according to the degree of air pollution of sulfur dioxide equal to 0-0.5 mg/100 sq cm/day, SO2 equals 0.5-1.0 mg/100 sq cm/day, and SO2 equals 1.0-2.0 mg/sq cm/day. The morbidity of the symptoms of the inhabitants in each section was compared; the morbidity was higher as the pollution by SO2 was higher in every symptom except stridor and gasp. When the morbidity was compared by air pollution and age of the inhabitants, the morbidity of sputum and gasp was markedly higher in the section where air pollution was higher. Although in some symptoms the morbidity was higher in the second area, than in the third, in all items the morbidity was higher in the two sections than in the first which had the lowest pollution. The frequency of occurrence of cough and sputum syndrome corresponding to Fletcher's definition of chronic bronchitis was higher in the inhabitants who lived in the more polluted section, especially in older persons.

1972

33416 **APTIC NO. 57063**

Abe, T., Y. Itokawa, and K. Inoue

STUDIES OF EXPERIMENTAL CADMIUM POISONING (1). THE EFFECTS OF PREADMINISTERING HEAVY METALS AND VITAMINS ON ACUTE CADMIUM POISONING IN MICE. *(Jikkenteki kadomiumu chudoku ni kansuru kenkyu. (1). jukinzoku, bitaminrui zentoyo ga mausu no kyusei kadomiumu chudoky ni oyobosu eikyo). Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 26(6):498-504, 1972. 18 refs. Translated from Japanese. Translation Consultants, Ltd., Arlington, Va., 18p.*

A study was made on the effect of preadministering microscopic quantities of cadmium, other heavy metals, and vitamins on experimentally induced Cd poisoning in mice via hematocrit tests and histological examination following sacrifice. A single administration of Cd resulted in marked atrophy of the testes and histologically necrotic patterns. Hypertrophy of the spleen and shrinkage of the kidney were also observed, and the hematocrit value was lowered. Reduction of zinc and magnesium occurred in the testes, while Zn content of the liver and kidney increased. Administration of large quantities of Cd after the preadministration of small quantities of Cd did not result in abnormalities such as atrophy of the testes and congestion, and there was an improvement in the hematocrit value. The quantity of Cd in the liver and testes increased over its value when Cd was administered alone, and reduction in the quantity of Mg and Zn in the testes was prevented. The hematocrit value was improved partially following the preadministration of other heavy metals and vitamins, but no marked suppression of testicular necrosis appeared.

33417 **APTIC NO. 57023**

Babskiy, Ye. B. and Ye. A. Donskikh

THE OPPOSITE NATURE OF THE ACTION OF MANGANESE AND NICKEL IONS ON THE ACTION POTENTIALS OF MYOCARDIAL FIBERS. *(O Protivopolozhnom kharaktere deystviya ionov margantsa i nikelya na potentsialy deystviya miokardial'nykh volokon). Dokl. Akad. Nauk SSSR, 207(5):1250-1258, 1972. 15 refs. Translated from Russian, 10p.*

Action potentials of frog ventricle heart muscle in Ringer solution resulting from rectangular pulse stimulation were measured in an effort to elucidate the action and interaction of manganese (2+) and nickel(2+) ions in connection with myocardial electrical activity. The results demonstrated that the ions are antagonists with respect to their effect on the conductivity of the slow sodium-calcium channel in the membrane of myocardial fibers. Nickel(2+) ions activated the slow sodium-calcium current blocked by Mn(2+) ions, causing an increase in amplitude of the final stage of rapid depolarization and significant lengthening of the action potential plateau of the myocardial fibers.

33418 **APTIC NO. 57054**

Brase, A. and E. Jahns

INVESTIGATION OF INITIAL CADMIUM DISTRIBUTION IN RATS. (*Untersuchungen zur initialen Cadmium-Verteilung in Ratten). Nucl. Med. (Stuttgart), vol. 11:307-311, Nov. 1972. 8 refs. Translated from German, 7p.*

Cadmium isotope 115mCd was intraveneously injected as a chloride into 24 white Wistar rats in an attempt to establish whether significant enrichment in the organs occurs during the first three half-lives of the isotope. The rats showed increased Cd accumulation in the liver, though no sufficiently high and selective enrichment in the kidney was observed. Presumably, the detoxification of the liver and the progressive deposition in the kidney occur in a protracted manner. Although scintillation spectrometry of the liver parenchyma could be used on the basis of the concentration behavior observed, the usual heavy isotopes are recommended for this application.

33419 **APTIC NO. 55381**

Goldsmith, John R.

LOS ANGELES SMOG VS. HEALTH. *Air Pollution, vol. 28, 29:11-16, March 1972.*

The effects of Los Angeles smog on health are discussed. The exhaust from cars has four effects: eye and respiratory tract irritation, a characteristic form of vegetation damage, a substantial amount of ozone, and interference with visibility. The average emissions in tons/day from vehicles are 2400 for hydrocarbons, 970 for nitrogen oxides, 12,800 for carbon monoxide, and 37 for sulfur dioxide. On more than one day out of two, the monitoring stations record concentrations higher than 0.1 ppm hourly average for ozone. About 75% of the people are bothered by pollution, and 90% of these report eye irritation. The cancer producing potential is lower than other urban areas because the air in Los Angeles contains a lower concentration of benzo(a)pyrene. The tumor-producing potency of crude particulate matter is also lower. Recent experimental research has shown that nitrogen dioxide exposures can produce a condition resembling emphysema in rats, mice, and rabbits. There is therefore still some concern that emphysema, a rapidly increasing cause of death in California, may be related in part to smoggy atmospheric conditions. California air quality standards are mentioned.

33420 **APTIC NO. 57047**

Gulyayev, Ye. A. and A. V. Aronova

THE ZINC, MANGANESE AND NICKEL CONTENT IN THE BLOOD OF DONORS. *(Soderzhaniye tsinka, margantsa i nikelya v krovi u donorov). Probl. Gematol. Pereliv Krovi, 17(9):56-57, 1972. 4 refs. Translated from Russian, 4p.*

The zinc, manganese, and nickel content in the blood of 97 donors was determined spectrographically in an effort to test the hypothesis that shifts are possible in the amounts of specified trace elements under the influence of repeated bloodletting. No significant changes were noted in the average indices when compared with data obtained from a control group of 79 non-donors. A tendency toward reduction in the Mn and Ni content was revealed, however, in a group of female donors who had given blood many times. (Author abstract modified)

33421 **APTIC NO. 57042**

Hattori, Shoji, Ryuhei Tateishi, Takeshi Horai, Taichi Nakajima, and Takeo Miura

MORPHOLOGICAL CHANGES IN THE BRONCHIAL ALVEOLAR SYSTEM OF MICE FOLLOWING CONTINUOUS EXPOSURE TO NO2 AND CO. *Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), vol. 10:16-22, 1972. 7 refs. Translated from Japanese, 8p.*

Mice were continuously exposed to low concentrations of nitrogen dioxide and/or carbon monoxide gas in an exposure chamber and microscopically examined after sacrifice for morphological changes in the bronchial epithelial system. Edematous change of Clara cells and swelling of epithelial cell cilia were observed on the 10th day of exposure to 50 and 100 ppm of CO and 0.2-0.5 or 0.5-0.8 ppm of NO2 mixed with CO (50 ppm), and shortening of the cilia was seen on the 30th and 45th day of exposure. Shortening of the cilia was not seen by exposure to CO gas alone. The shortening and/or loss of cilia appears related to a decrease or arrest of ciliary motility and a decrease in the function to excrete foreign substances. This suggests that lung pollution by solid particles is further stimulated by the effects of low concentrations of these gases. Proliferation of bronchial epithelial cells was observed on the 30th day of exposure to 0.5 0.8 ppm of NO2 alone or mixed with 50 ppm of CO. The finding of hyperplastic foci after 30 days of exposure to NO2 suggests the possibility that long term inhalation of the gas by man could play an accelerative role in the development of lung cancer through the synergistic action of NO2 and the carcinogenic substances in the atmosphere. Degeneration of mitochondria of the alveolar wall cells and fusion and partial degeneration of osmiophilic bodies were also found after exposure to mixtures of NO2 and CO.

33422 **APTIC NO. 57041**

Kuznetsov, V. I. and V. I. Novoselov

EFFECT OF ZINC IONS ON THE INCORPORATION OF TAGGED LEUCINE IN THE HIPPOCAMPUS AND NEOCORTEX OF RATS. *(Vliyaniye ionov tskinka na vklyucheniye mechenogo leitsina v gippokamp i neokorteks krys). Izv. Akad. Nauk SSSR, vol. 6:892-894, 1972. 17 refs. Translated from Russian, 7p.*

Administration of 10 micrograms of zinc in the cerebral lateral ventricle of male Wistar rats and subsequent isolation and homogenization of the tissue revealed a decrease in the incorporation of 1-C14-leucine in the regio inferior of the hippocampus as compared to controls. Incorporation in the regio superior and neocortex was unchanged. Doses of 1 and 2 microgram of Zn caused an increase in leucine incorporation in the entire hippocampus without changing incorporation into the neocortex. Hence there may be two mechanisms of action of Zn dependent upon the concentration employed. The 1 and 2 microgram dosages are postulated to increase protein synthesis in the hippocampal regio inferior by means of interaction of Zn ions with an unknown mediator of the synapses of muscle fibers and participation of the adenylcyclase system. (Author abstract modified)

33423 **APTIC NO. 57074**

Oziebło, Leszek

ESTIMATION OF ZINC AND COBALT CONTENT IN HUMAN SEMEN. *Endokrynol. Pol., 24(1):91-95, July 3, 1972. 7 refs. Translated from Polish, 8p.*

Zinc and cobalt were analyzed in normal and abnormal human semen by the photocolorimetric method in an effort to establish a correlation between sperm count and level of the metals. Highest levels of Zn were found in normospermic samples and lowest in azoospermic samples. The existence of a positive correlation between the number of spermatozoa and the level of Zn in the semen was established by dividing the data observed into groups according to count of spermatozoa per ml of semen. No such correlation could be established for Co. (Author abstract modified)

33424 **APTIC NO. 57071**

Pirotskaya, E. N.

THE CLINICAL COURSE OF BERYLLIOSIS. *(Klinicheskoye techeniye berillioza). Vrachebnoe Delo (Kiev), vol. 2:139-140, Feb. 1972. Translated from Russian, 4p.*

The clinical course of a case of beryllioosis is given for a man who had worked for two and a half years with beryllium oxide in a foundry. The patient complained of general fatigue, acute weakness, tendency to perspire, coughing with spitting, and pain in the chest. X-ray of the lungs at time of admission showed diffuse intensification of the lung picture with a large number of small round formations of 2 mm or less in diameter which were uniformly distributed over the entire area of the lungs. The existence of beryllosis in the form of pulmonary granulomatosis was established. The patient s condition gradually worsened over the next five years despite removal from his previous work situation and treatment with corticosteroid hormones. Signs of pulmonary insufficiency developed, heart size increased, and an increase in liver dimensions was observed. X-ray revealed a merging of individual nodular shadows into large spot formations 5-8 mm in diameter, and the sputum contained leucocytes, numbering 20-40 in the visual field. Determination of amino acid composition of the blood serum revealed an increase, evidently caused by damage to the liver. Hence, the clinical course of the disease is characterized by progression of the process regardless of cessation of work with beryllium and adequate treatment.

33425 **APTIC NO. 55705**

Roth, Roland P. and Martin F. Tansy

EFFECTS OF GASEOUS AIR POLLUTANTS ON GASTRIC SECRETO-MOTOR ACTIVITIES IN THE RAT. *J. Air Pollution Control Assoc., 22(9): 706-709, Sept. 1972. 20 refs.*

The gastric motor activity of conscious unrestrained rats in an exposure chamber was monitored by means of a chronic intragastric balloon in order to ascertain whether gaseous air pollutants such as sulfur dioxide, nitrogen dioxide, carbon monoxide, and ozone can influence gastric secreto-motor activities. The effects produced upon gastric secretory volume and total titratable acid secretion were also studied in rats which were pylorusligated subsequent to exposure. Rats exposed to 1 ppm SO2 for 5 days, 60 ppm CO for 2 hr, 0.5 ppm NO2 for 2 hr, or 0.25 ppm O3 for 2 hr showed no change; while there was gastric inhibition at 300 ppm SO2 for 2 hr, 1400 ppm CO for 1 hr, 26 ppm NO2 for 2 hr, and 1.5 ppm O3 for 2 hr. Recovery was complete within minutes following chamber flushing in most instances. The rats were also exposed to oil of mustard, benzaldehyde, hydrogen peroxide, amyl acetate, and aftershave lotion to evaluate the site and nature of stimulation. Saturated dental paper points were introduced without obstruction into tracheal and retro-nasal cannulae. Oil of mustard inhibited gastric motility only when applied to the trachea. The drop in activity was generally immediate and proportional to the degree of exposure. Nasal irritation was ineffective in eliciting the response. The experimental results indicated that toxic levels of the gases tested are associated with an inhibition of gastric motility that is not produced by exposure of the nasal passages alone to the gases and that the toxic levels produce no demonstrable effect upon either total gastric acid secretion or total secretory volume. (Author abstract modified)

33426 **APTIC NO. 57025**

Shevchuk, I. A. and L. I. Sandulyak

CONTENT AND FUNCTIONAL HISTOTOPOGRAPHY OF ZINC IN THE KIDNEYS. *(Soderzhaniye i funktsional naya gistotopografiya tsinka v pochakakh). Byull. Eksperim. Biol. I. Med., vol. 73:44-47, 1972. 10 refs. Translated from Russian, 9p.*

Investigations were conducted on 30 male white rats in order to study the content and distribution of zinc in the kidneys under normal conditions and during increased activity of the nephrons and juxtaglomerular apparatus. One kidney was removed surgically from each animal (the removed kidneys served as controls) in order to increase functioning of all parts of the nephrons. The rats were sacrificed, and the kidneys were subjected to histological and histochemical investigation. Total Zn content was determined by the polarographic method. The determinations revealed a far greater Zn content in the cortical matter than in the medullary matter. Zinc was localized for the most part in the cell cytoplasm of juxtaglomerular apparatus, performing an endocrinal function, and in those parts of the nephron where resorption is performed. The metal s concentration was found to increase in accordance with the increase in functional activity of these parts of the nephron.

1971

33427 **APTIC NO. 55500**

Council on Environmental Quality

TOXIC SUBSTANCES. *35p., April 1971. 49 refs.*
GPO

A study on the health and environmental effects of metals and synthetic organic chemicals is presented. Recent incidents of mercury and other contaminations of the environment and the diversity and quantities of toxic and potentially toxic substances entering the environment indicate a growing national problem. Toxic substances of particular concern are lead, cadmium, mercury, vanadium, and nitrilotriacetic acid, orthonitrochlorobenzene, and polychlorinated biphenyls. New regulatory authority, improved research, and better monitoring systems are recommended and must be implemented now if protection is to be provided. The approach called for in the Toxic Substances Control Act is a new way of looking at environmental problems. Rather than dealing with pollutants as they appear in air, in water, and on land, it represents a systematic and comprehensive approach to the problem. It relies on understanding the flow of potentially toxic substances throughout the entire range of activity--from extraction to production to consumer use and to disposal. Only through such a comprehensive approach can protection be provided to man and his environment. (Author summary modified)

33428 **APTIC NO. 55657**

Biller, Rainer

THE PHYSIOLOGICAL EFFECT OF EXHAUSTS FROM TRACTOR DIESEL ENGINES ON THE DRIVER. *(Die physiologische Wirkung der Abgase von Schlepper-Dieselmotoren auf den Fahrer). Text in German. Landtechnik, (17):457-461, Oct. 1971. 31 refs.*

The most important pollutants in exhausts from Diesel engines such as oxides of nitrogen, soot, carbon monoxide, and hydrocarbons, their concentration usually measured in diesel engines, and their effects on humans are reviewed. Since the dilution of these pollutants from the exhaust pipe to the driver is 1 to 100, the CO and HC emission to which the driver is exposed is far below the danger level. Of importance are solely the oxides of nitrogen which may reach 15 to 20 ppm.

33429 **APTIC NO. 57073**

Faggiano, Christiano

CONTAMINATION BY CARBON MONOXIDE. *(Contaminacao pelo monoxido de carbono). ITA-Engenharia, vol. 2:34-37, Sept. 1971. Translated from Portugese, 15p.*

Physical properties, poisoning symptomology, dangers within aircraft cabins, and detection equipment are reviewed in relation to carbon monoxide. Inhalation of the gas results in its combination with hemoglobin at the expense of oxygen, the result being asphyxia. Concentrations in excess of 50 ppm are considered dangerous; and may lead to symptoms of apathy, headache, palpitation, weakness, vertigo, loss of motor control, vomiting, convulsions, and coma. Possible sources of contamination, precautionary measures, and detection equipment are discussed in relation to the possible hazard it poses in aircraft cabins.

33430 **APTIC NO. 57031**

Fristedt, B. and B. Akesson

HEALTH HAZARDS FROM AUTOMOBILE EXHAUSTS AT SERVICE FACILITIES OF MULTISTORY GARAGES. *(Halsorisker av bilavgaser i parkeringshusens serviceanlaggingar). Hyg. Revy, no. 60:112-118, 1971. 6 refs. Translated from Swedish, 11p.*

A study was conducted on 34 automobile service personnel in Sweden to determine if health hazards exist from automotive exhaust in service installations of enclosed parking areas. Blood was drawn from the subjects and tested for red and white blood cell count, carboxyhemoglobin (COHb), lead content, and aminolevulinic acid dehydrogenase (ALAD); case histories were also taken, including the recording of smoking habits. Those subjects working in the sales areas of such installations at street level showed no indication of discomfort that could be attributed to automotive exhaust; while a great many of those working in the service shops did experience discomfort and showed slight increases in carbon monoxide and lead content and a reduction of ALAD in the blood. Discomfort was most pronounced on days when the volume of traffic between the parking and service areas was at its peak. The mean carbon monoxide content recorded at one service shop was 30 ppm, though a value of 50 ppm was reached on the day of examination; there was good correlation between the 50 ppm mean content measured and the mean COHb value of 7.5% found in the study. An ALAD under 70 approximately is representative of discomfort-causing exposure.

33431 **APTIC NO. 55487**

Harada, Akiro

ELECTROPHORESIS OF URINARY PROTEIN. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 17 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 210-231, April 1973.*

A study was undertaken to determine the value of the disc electrophoresis method in distinguishing among different kinds of urinary protein. Pattern forms should be used instead of protein graduation and A/G ratio for the diagnosis of urinary protein. The amount of protein suitable to the densitometer must be determined and patterns must be obtained under the same conditions. The but diagnosis of urinary protein is possible by disc electrophoresis, this diagnostic method may be useful only for the purpose of screening. If the amount of protein used for phoresis does not match the densitometer requirement, the urinary protein of a healthy person begins to show a pattern resembling that of a Cd worker, and the characteristic urinary protein pattern may fail to emerge in the case of itai itai disease patients and cadmium workers may fail to emerge. When the pattern obtained by disc electrophoresis is similar to that of the urinary protein of Cd workers, the existence of renal tubular damage must be determined by means of molecular weight measurements or kidney function examination.

33432 **APTIC NO. 55471**

Hasegawa, Yutaka

RESULTS OF EXAMINATION OF RESIDENTS IN CADMIUM-POLLUTED REGIONS. *Japan Public Health Assoc., Proc. Sci. Re. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 32-56, April 1973.*

A study of the effects of cadmium pollution on the health of the residents in seven polluted prefectures is discussed. The subjects were given primary examinations to determine the incidence of high blood pressure, heart disease, kidney disease, diabetes, neuralgia, bone and joint ailments, nose ailments, and respiratory ailments. Urinary protein and sugar were also measured. Those persons exhibiting positive urinary protein results in the primary examination were given secondary examinations to determine the urinary cd concentration, urinary protein, serum alkaline phosphatase, serum inorganic phosphorous, blood pigment, serum calcium, hemoglobin count, and hematocrit value. The results were analyzed with regard to the sex and age of the subject. No clear change attributable to cd was discovered, except that the urinary cd concentrations of the subjects in the polluted regions exceeded the previously accepted normal range of values.

33433 **APTIC NO. 55474**

Ishizaki, Arinobu

CADMIUM ABSORPTION AND ACCUMULATION (IN ANIMALS). *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 1 ref. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 93-104, April 1973.*

The calcium concentrations were measured in various organs of adult rats given 50 ppm cadmium in their water for 6 months. During the first month following the cessation of cd administration, the cd concentrations in the liver, kidney, spleen, and pancreas increased; the concentrations in all other organs decreased. The concentrations in the liver and kidneys remained the same between the first and sixth months after the cessation of treatment, and decreased by the ninth month. After 1 month, the concentrations in the livers, kidneys, spleens, and pancreases of the females were higher than in those of the males. Results are also reported for experiments in which 25, 10, and 5 ppm cadmium were administered. The results of an experiment in which young rats were raised on high calcium nonpolluted rice, low calcium nonpolluted rice plus cadmium chloride and cadmium polluted rice are also reported. The rate of calcium accumulation tended to increase in proportion with the amount administered, was higher in the females than the males, and was nearly the same in the groups administered the cadmium polluted diet and the nonpolluted diet to which $CdCl_2$ had been added. Tendencies toward reduced bone calcium were also noted in the latter two groups as was a tendency toward lime loss in the bone tissue. In rats given 0.5 or 1.0 ppm calcium in their drinking water over 24 hours, (during which no food was given) the amount of cadmium absorbed by the body was greater than when solid food containing the same amount of cadmium was given.

33434 **APTIC NO. 55481**

Kawano, Minoui, Shojiro Ito, Eiichi Koyama, Hisashi Komatsuzaki, Kinji Gonda, and Saburo Otomo

ANALYSES OF CADMIUM IN ORGANS AND ITS PROBLEM POINTS. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 2 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 151-155, April 1973.*

The cadmium concentrations in the kidneys of humans who died from diseases unrelated to cd poisoning were measured by the atomic absorption method. The relative percentage of cd per organ varied according to whether it was expressed per wet weight, per dry weight, or per ash weight. The ratios of wet weight to dry weight varied between 12 and 40%, and the ratio of dry to ash weight fluctuated between 0.3 to 3.4%. In terms of ash weight, there were six instances of cd occurring in amounts greater than 10,000 micrograms/gr, indicating that this level can appear in persons who are normal with respect to cd poisoning.

33435 **APTIC NO. 55475**

Kitamura, Shoki

CADMIUM ABSORPTION AND ACCUMULATION (ESPECIALLY IN HUMANS). *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from*

Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 104-112, April 1973.

The rate of cadmium absorption through the intestines of pregnant, suckling, lactating, thirsty, and hungry mice is about 2 to 3%, or roughly the same as in normal mice. The rate of cd absorption through the intestine of a 55-year-old man weighing 70 kg was studied. Following the ingestion of 350 g/day of rice containing 0.06 ppm cd, an absorption rate of 5.34% through the intestine was found; the rate of absorption through the intestine was 1.35% following the ingestion three times daily of 650 grams of rice containing 5 mg of calcium. There is not much difference in the rate of cd absorption through the intestine when the intake rate is large as opposed to small. The biological half-life of cd in mice is about 50 days. In humans, the accumulation of cd does not increase with age, but reaches a ceiling at about 30 years of age.

33436 **APTIC NO. 55479**

Kiwa, Toshiharu

SEVERAL ANALYTICAL CHEMICAL PROBLEMS CONCERNING BIOLOGICAL SAMPLES. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 133-143, April 1973.*

Before a biological sample is analyzed, it should be dried to bring it to an agreed-upon uniform condition. The weight lost during drying should be recorded. During the drying process, the sample may be polluted from the outside. The sample is subjected to wet ashing after drying, and the cadmium is then separated from the sample via dithizone extraction, and measurement made using the atomic absorption method. If raw samples are freeze-dried instead of dried by other means, there is no danger of contamination and the sample is obtained in powdered form. The freeze drying method is described, as is the wet processing of frozen samples. The minimum working concentration for a biological sample is derived from the results of numerous analyses on the same kind of sample. The limit at which the the analytical values can be obtained with a relative error of 1% when 1 gram of sample is collected and there are 100 ml of solution for the final measurement is 0.2% for cadmium is the atomic absorption method is used. The error associated with the measurement of absorption when the atomic absorption method of the color comparison method is used is minimal when the absorptivity is 0.4343 (36.8% in terms of transmissivity). Experiments should be conducted with transmissivity at least in the range 20 to 80 (0.699 to 0.0969 in terms of absorptivity).

33437 **APTIC NO. 55473**

Kogayashi, Jun

SAMPLING AND MEASUREMENT METHODS FOR BIOLOGICAL SAMPLES. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 77-92, April 1973.*

Some techniques for simplifying the sampling and measurement of cadmium and metals in biological samples are discussed. With regard to human and animal tissue samples, if the object is to determine analytical values for the tissue itself, the blood should be removed from the sample: the quantities of such things as moisture, dry substances, and heavy metals will vary according to the amount of blood present. With all biological samples, it is important that as many samples as possible be taken and that their average value be considered. The moisture fluctuation in plants must be taken into account when analyzing them; the samples should be dried at 100 C until their weight stops changing. Total blood is weighed immediately after is is obtained, after being dried at 80 C, and after being dried at 100 C; it is then subjected to dry-wet ashing prior to analysis. Urine is acidfied, evaporated, and subjected to wet ashing. Excrement is emulsified with water, ashed, dried, and weighed. A combined dry-wet ashing method which makes use of mixed acid and an electric furnace is described. The dithizone extraction method for extracting and separating cadmium and other metals is also discussed, as is the atomic absorption method.

33438 **APTIC NO. 55488**

Mackawa, Kyutaro and Yasuo Tsunenari

MECHANISM OF TESTICULAR DESTRUCTION BY CADMIUM. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 68 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 232-257, April 1973.*

The reason the testicles are selectively damaged following a single injection of a relatively small amount of cadmium was investigated. Although the oral administration of Cd can produce testicular damage, the damage is less severe and permanent than following Cd injection. The results of a series of experiments indicated that the spermatic artery-pampiniform plexus complex is not the site of Cd induced testicular damage, the indication is that the problem occurs inside the testicles themselves. The regions inside the testicle which could be the site of cadmium activity are the spermatic tubules or the testicular intersitial tissue. Experimental data indicate that, although damage to the seminiferous tubules cannot be the cause of the damage to the entire testicular region, there is a possibility that the seminiferous tubules sustain Cd damage directly. The most likely site of Cd activity is the testicular interstitial tissue. In this event, the damage may be to the Leydig cells of the interstitial tissue (i.e., damage to the secretion of male hormones) or to the small blood vessels of the interstitial tissue. The experimental data support the latter as the site of Cd induced damage.

33439 **APTIC NO. 57092**

Mikhaylov, V. A., N. V. Tyushnyakova, A. V. Saknyn, L. N. Yelnichnykh, and A. S. Vorontsova

GENERALLY TOXIC ACTION OF NICKEL-CONTAINING DUSTS. *(K voprosu ob obshchetoksicheskom deystvii nikel soderzhashchikh pyley). Vop. Gig. Prof. Patol. Tsvet. Chern. Met., 1971:200-206, 1971. 11 refs. Translated from Russian, 11p.*

An investigation was made of the toxic action of nickel dusts (primarily sulfides and oxides of nickel) gathered from pyrometallurgical shops of nickel plants by administration of dusts to mice and rats and subsequent blood analysis and pathomorphological study. The results indicated that the dusts have a generally toxic action, and dust which contains sulfides and oxides of nickel is toxic not only when taken intratracheally or intraperitoneally, but also when inhaled. The dusts resulted in impairment of the albumin and carbohydrate functions of the liver, changes in the peripheral blood, and acceleration of the maturation of reticulocytes. The toxicity of the dusts tested appeared to depend not only on the nickel itself but also on the chemical compounds, particularly sulfur compounds, by which the nickel enters the organism. The observations thus give a basis for interpreting the decline in the function of the liver of patients suffering from nickel pneumoconiosis as resulting from the generally toxic action of sulfide and oxide compounds of nickel.

33440 **APTIC NO. 55484**

Nakagawa, Akitada, Tetsuke Hirono, and Isamu Murata

RESEARCH ON CADMIUM ABSORPTION AND DISCHARGE. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 161-169, April 1973.*

Systematic autoradiography was used to study the distribution of cadmium (109) in adult female DDN mice. The Cd which entered the alimentary canal was absorbed through the intestinal tube and is thought to have accumulated primarily in the liver, kidney, and intestinal mucous membrane. When Cd(109) was administered orally to female mice, 50 to 70% was absorbed through the intestine, with 50 to 60% of this was discharged from the kidney within the first day. The remainder was stored, mainly in the liver and kidney, and subsequently discharged. In a third experiment, the absorption of Cd(109) through the intestine and its discharge were measured following the administration of high concentrations of Cd to mice over a long period of time. The Cd absorption through the intestine declined considerably, with a greater part remaining unabsorbed and being discharged in the excrement. When female mice were given Cd(109) three times at intervals of 7 days, about 50 to 70% of the amount administered was absorbed through the intestinal wall and 40 to 60% of the absorbed amount was quickly discharged from the kidney.

33441 **APTIC NO. 55477**

Noda, Kinjiro

INCREASE AND DECREASE OF POISONS IN CORPSES. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 121-126, April 1973.*

The relationship between pollution and legal medicine is discussed. The water and ash contents of fresh bones differ from those of bones taken from the skeletons of decayed corpses. The following minerals are found, in order of decreasing concentration, in fresh bones: calcium, magnesium, phosphorus, titanium, aluminum, sodium, copper, iron, and silicon. Potassium and boron are also found in many samples, and manganese may occasionally be found. In cases of lead poisoning, lead is found in large amounts. When bones are buried in the earth, Fe and Si increase, Na decreases, and nonphysiological minerals (i.e., soil minerals such as barium, iridium, zinc, and vanadium) gradually appear. Eventually the composition of bones and soil match. Cadmium, upon entering a living body, combines with protein.

33442 **APTIC NO. 55482**

Nomiyama, Kazunari, Jun Kobayashi, Tsuneo Takishima, Akira Harada, Kuniaki Fukushima, and Yukio Seki

SIMULTANEOUS MEASUREMENTS OF CADMIUM CONCENTRATION IN ORGANS BY SEVERAL RESEARCH ORGANIZATIONS (INTERIM REPORT). *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 3 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 155-158, April 1973.*

Six research organizations simultaneously measured the cadmium concentrations in 1 gr organ samples taken from the same two corpses; organs from several other corpses are also being studied. The samples were ashed by the wet or dry-wet methods, the cd was extracted by the dithizone-chloroform or APCD-MIBK methods, and the atomic absorption method was used for measuremtnt. The results indicated that agreement was good with a measurement error of 10% taken into account. A cross check should be made by another research organization when measuring the cd concentration in a corpse, and a standard organ with a known cd concentration shoudl be available for an organization to check its technical ability prior to the actual measurement. A system for preserving and supplying such standard organs must be quickly established.

33443 **APTIC NO. 55483**

Nomiyama, Kazunari

RELATIONSHIP BETWEEN CADMIUM EXPOSURE AND CADMIUM CONCENTRATION IN ORGANS. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 21 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 159-161, April 1973.*

The liver/kidney cadmium concentration ratio is 0.10 to 0.20 for persons not exposed to cd, and it is over 0.35 for exposed persons. This ratio was 1.4 to 3.7 for itai-itai disease patients and 0.05 to 1.25 for the residents of cd polluted regions. The liver/kidney ratio should be carefully studied when discussing Cd pollution from the point of view of the Cd concentration in the organs, and that the liver seems to play the role of Cd reservoir, indicating the need to study changes in liver tissues and function during exposure to Cd.

33444 **APTIC NO. 55486**

Nomiyama, Kazunari

KIDNEY DAMAGE IN CADMIUM POISONING. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 47 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 185-210, April 1973.*

The kidney damage resulting from cadmium poisoning was studied. When Cd 115 m is injected along with insulin into rabbits, most of the Cd is either reabsorbed by the renal tubes or becomes attached. It was not possible to determine the regions of reabsorption and secretion. When Cd was directly administered by means of a heart catheter, the rate of urine production dropped sharply with increasing Cd administration; the decline was due to a decrease in the kidney blood-plasma flow. The results of several experiments indicated that the early diagnosis of kidney damage and the evaluation of the extent of the damage are possible by measuring the urinary enzyme activity. The relationship between total Cd dosage and biological response in both animals and humans is discussed. Among a group of 75 workers engaged in Cd manufacturing, the amount of positive urinary protein was higher than among a control group, but the positive urinary sugar was not higher. It is advisable at present to use both the acetic trichloride and sulfosalicylic acid methods for the quantitative analysis of urinary Cd. The diagnosis of Cd poisoning must be conducted carefully by testing the nature of the urinary protein and kidney functions even if the amount of Cd in the urine is high and the urinary protein is positive. The simple visking tube-carbowax method is recommended for examining the properties of the urinary protein. A simple method is also described for the quantitative analysis of the total amount of amino acids in the urine.

33445 **APTIC NO. 55480**

Oyagi, Yoshikiko

CADMIUM ANALYSIS METHODS AND THEIR PROBLEM POINTS. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 143-151, April 1973.*

The major problems involved in the atomic absorption method for cadmium analysis in food and tissues are discussed. Decomposition by wet oxidation, low-temperature ashing, and dry ashing are discussed as means of preprocessing. Solvent extraction can be accomplished using the APCD-MIBK system, the DDTC-MIBK system, or the DZ-CHC13 or CC14 system. The atomic absorption method of analysis is fairly sensitive with respect to cd and allows detection down to a fairly low concentration; however, one must watch for false increases in analytical values due to the presence of the halides of the alkaline metals and alkaline earth metal elements. The atomic absorption method was used to measure the cd content of a standard heparin sodium solution. Cadmium concentrations between 0.022 and 0.025 ppm were found.

33446 **APTIC NO. 55517**

Schorn, Gert

MANKIND THREATENED BY SLOW DEATH. *(Wir leben mit dem schleichenden Tod). Text in German. Deut. Apoth.-Z., 111(2):46-49, Jan. 1971.*

Global problems of environmental pollution are outlined, and criticism is given of the ignorance and one-sided profit-mindedness displayed in environmental issues. The steady increase in the atmospheric carbon dioxide concentration, a result of ever-increasing energy demands, high carbon monoxide and sulfur dioxide levels, occurring especially in urban agglomerations with heavy traffic and in industrial areas, as well as the ubiquitous presence of lead and fluorine in the atmosphere are among the serious environmental hazards. Health, plant, and material damages due to CO, SO2, and nitrogen oxides are described. The hazards of lead residue are in its ability to accumulate in the human organism and to pass the placental barrier. Lead is activated during pregnancy, and it interfered with the synthesis of desoxyribonucleic acid, sexual functions, and spermiogenesis. Adequate technical solutions are now available for the control of vehicle exhaust CO emissions.

33447 **APTIC NO. 55476**

Seki, Yukio and Kenzaburo Tsuchiya

CADMIUM CONCENTRATIONS IN ORGAN TISSUE. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 113-121, April 1973.*

The kidney cortex, kidney medulla, liver, pancreas, heart muscle, aorta, and bile of human accident victims were analyzed for cadmium concentration. The decrease in the cd content of tissues proceeds at a slower rate than the decomposition of the tissues. The wet ashing method using sulfuric acid and nitric acid was used to decompose the organic substances in the organs. The cd was extracted using the dithizone method, with the final measurement being made via atomic absorption spectrophotometer. Cadmium concentration is highest in the kidney cortex, the average value was 55 microgram/g wet wt.

33448 **APTIC NO. 55576**

Shanmugaratnam, K.

STUDIES ON THE ETIOLOGY OF NASOPHARYNGEAL CARCINOMA. *Int. Rev. Exp. Pathol., no. 10:361-413, 1971. 134 refs.*

Studies on the etiology of nasopharyngeal carcinoma, a neoplasm which occurs with exceptionally high frequencies among the mongoloid races of South China and Southeat Asia have thus far resulted in no hypothesis substantiated by adquate evidence. Case control studies on environmental factors such as the inhalation of smoke, incense, and a few other substances have yielded negative results so far; more elaborate studies, however, are needed to test specific factors with controls matched for occupation, social class, and other variables. Animal experiments have demonstrated that nitrosamines are capable of producing nasal and pharyngeal carcinomas regardless of their route of administration. Virological and immumological studies have established a close relationship between the herpes type virus infection and nasopharyngeal cancer, but they have not excluded the possiblity that the virus may be a passenger in the neoplasm, not its cause.

33449 **APTIC NO. 57040**

Shevchuk, I. A. and L. I. Sandulyak

ZINC CONTENT IN PANCREAS AND ITS RELATIONSHIP TO FUNCTIONAL ACTIVITY OF LANGERHANS ISLANDS. *(Soderzhaniye tsinka v podzheludochnoy zheleze ego svyazi s funktsional noy aktivnostyo ostrovkov langergansa). Probl. Endokrinol., vol. 17:113-117, 1971. 73 refs. Translated from Russian, 14p.*

A review of the active role of zinc in physiological processes with particular emphasis on Zn content in the pancreas and its relationship to functional activity of the islands of Langerhans is presented. Research data indicates that Zn is of specific importance for the incretory function of the pancreas, and a dependence is established between the functional state of the island cells and their Zn content. The role of Zn in diabetogenesis is unquestionable, but the mechanism of this process has not been clarified. There still is no explanation for the participation of Zn in insulin synthesis and its elimination from beta-cells; its participation in intermediate carbohydrate metabolism is also unexplainable at present. The influence of exogenously administered Zn salts on carbohydrate metabolism and on the state of insular apparatus is clear, and this influence is evidently dependent on the Zn dose and the species of animal. These factors are in turn related to the different needs for this trace element by different animals for normal vital functioning. Investigations in this direction may possible validate the use of Zn salts for therapeutic purposes. Another possibility is the use of radioactive Zn isotopes for functional diagnosis of pancreatic insular diseases. (Author summary modified)

33450 **APTIC NO. 55478**

Shigematsu, Itsuzo

WHO AGREEMENT CONCERNING ORGAN SAMPLING. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 126-133, April 1973.*

The World Health Organization Agreement on the collection, preservation, and transportation of dissected samples for the analysis of small amounts of elements is discussed. The agreement covers subjects, collection of dissected samples, choice of tissues, and the preservation and transportation of samples. A method for the collection of samples for quantitative analysis of metals in organs is also discussed, and information to be obtained on an autopsy subject is presented.

33451 **APTIC NO. 55490**

Suzuki, Shosuki and Testuya Tanaka

VARIOUS BIOLOGICAL PROBLEMS CONCERNING CADMIUM POISONING. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 271-278, April 1973.*

The absorption of cadmium through the digestive organs of the mouse and monkey were compared. Within 5 days following the injection of less than 1 microgram of Cd to a female monkey, 43.5% of the metal was discharged, 46.8% stayed in the gastrointestinal tract, 7.21% remained on the gastrointestinal walls, and 0.65% was distributed through other parts of the body. The rate of absorption was, therefore, 0.65%; the maximum absorption rate would be at most 1.3%. The rate of Cd absorption through the gastrointestinal tracts of white mice increases with the concentration of Cd administered. The administration of Cd to white mice over a period of months results in a decrease in the absorption rate of the metal, indicating that the intestine becomes accustomed to it.

33452 **APTIC NO. 55491**

Takeuchi, Jugoro

PATHOPHYSIOLOGY OF ITAI-ITAI DISEASE. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 327-339, April 1973.*

Itai-itai disease should be considered pathohistologically as Fanconi disease, a syndrome to which chronic cadmium poisoning bears many similarities. Although heavy metals may be the cause of itai-itai disease, it cannot be concluded that they are definitely the cause since many aspects of the pathogenisis of the disease are still unknown. While osteomalacia is a major manifestation of the Fanconi syndrome, it is difficult to explain its occurrence in Cd workers on the basis of Cd accumulation alone. Also, no cases of itai-itai disease have been found in Cd polluted areas other than the Jinzu River basin. Finally, while renal tubular proteinuria is a symptom of Fanconi syndrome, very few cases of renal tubular proteinuria have been reported among those living in Cd polluted areas. Thus more research is needed to determine the validity of the Cd poisoning theory of itai-itai disease.

33453 **APTIC NO. 55485**

Tsuchiya, Kenzaburo

RESULTS OF A LONG-TERM OBSERVATION OF CADMIUM WORKERS. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 16 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 170-185, April 1973.*

The physical health of a group of men working in a cadmium plant was observed over a period of several years, during which time the concentration of environmental Cd to which they were exposed decreased. The general health condition of individual workers did not differ greatly from that of the general population. Values are reported for the Cd concentrations in the blood and urine. The workers had relatively low red corpuscle constituents, greater amounts of white blood cells, smaller numbers of lymph cells, increased alkali phosphatase, high protein values, and slightly high delta-aminolevulinic acid as compared with controls: all values were within the normal range. There were slight nonspecific abnormalities in the kidneys from the standpoint of optical microscopy. Although both Cd EDTA and penicillamine increase the discharge of Cd in the urine, neither should be used in the treatment of Cd poisoning. No change in lung or olfactory function was noted, and no bone changes were noted. A transient irritation in the upper air passage is often reported. The allowable environmental standard for Cd should be changed from 0.1 mg/cu m to 0.05 mg/cu m.

33454 **APTIC NO. 55489**

Yoshikawa, Hiroshi and Yasutomo Suzuki

MODIFICATION EFFECTS OF METALS ON ACUTE CADMIUM POISONING. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 8 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 257-271, April 1973.*

If a small amount of cadmium is injected into mice 24 hours prior to the injection of a lethal dose of the same metal, the lethal dose becomes less lethal; the results are the same when the preliminary dose is given orally. Some tolerance to the lethal effects of the second dose are seen 5 hours after the preliminary dose, and the tolerance lasts for about 3 days. Preliminary doses of mercury, indium, and manganese also produce tolerance to lethal dosages of Cd, while copper and zinc do not; thus, the tolerance is based on a nonspecific mechanism. Cadmium pretreatment also reduces the toxicity of a second toxic dose of Cd, and it prevents most of the notable changes in organ weight generally seen after toxic doses of the metal; the weight of the liver, however, increases after the second toxic dose. Pretreatment with Mn and Mg also reduce the toxic effects of Cd while Zn and Ni do not. Cadmium pretreatment reduces the discharge of a second dose of Cd from the body, increases the Cd content of the liver following the second dose, and does not affect the Cd content of the blood, kidney, spleen, or testicles. The liver plays the principal role in the tolerance phenomenon.

1969

33455 **APTIC NO. 57053**

Sporn, A., Ileana Dinu, Liana Stoenescu, and Adriana Cirstea

CONTRIBUTIONS TO THE DETECTION OF CADMIUM-ZINC INTERACTIONS. *(Beitraege zur Ermittlung der Wechselwirkungen zwischen Cadmium und Zink). Nahrung, 13(6):461-469, 1969. 22 refs. Translated from German, 15p.*

The effects of cadmium (10 ppm) and zinc (80 ppm) were studied over a period of 60 days on the growth of 96 white rats and on the activity of the liver enzymes glutamic oxaloacetic transaminase (GOT), alkaline and acid phsophatases, aldolase, phosphorylases a and b, glucose-6-phosphate dehydrogenase, and the succinoxidase and oxidative phosphorylation systems of the hepatic mitochondria. The study demonstrated that Zn completely inhibits the action of Cd on oxidative phosphorylation and partially inhibits the action on phosphorylase a. The inhibiting effect of Cd on GOT, aldolase, alkaline phosphatase, and the succinoxidase system was not influenced. Cadmium and Zn showned neither synergism nor antagonism under conditions of acute experiments. The interrelationship of Cd and Zn with the enzymatic processes is concluded to be specific for certain enzymes or metabolic chains. (Author abstract modified)

1968

33456 **APTIC NO. 57049**

Yelfimova, Ye. V., M. I. Gusev, Yu. V. Novikov, T. V. Yudina, and A. N. Sergeyev

A STUDY OF THE JOINT RESORPTIVE ACTION OF ATMOSPHERIC POLLUTANTS (GASES AND DUST). *(Izucheniye kombinirovannogo rezorbtivnogo deystviya atmosfernykh zagryazneniy (gazov i pyli)). Preprint, 1968 (?). 5 refs. Translated from Russian, 12p.*

White rats were exposed to 0.05 mg/cu m of sulfur dioxide, 1 mg/cu m of carbon monoxide, 0.01 mg/cu m of phenol, and 0.15 mg/cu m of dust in a priming chamber for 96 days to assess the long-term effect of components commonly discharged by the iron metallurgical industry. Blood and urine analyses were performed, and tracer techniques were employed for distribution studies of the various organs after sacrifice of the animals. Pathomorphological investigation revealed hypoplasia in the peribronchial lymphatic nodes of the lungs; hyperplasia of these nodes, catarrhal bronchitis, and tracheitus were also detected in some cases. Decreased permeability of the histohematic barrier was noted in several organs, and nucleic acids in the whole blood as measured by the spectrophotometric method were also found diminished over most of the experiment period. The joint resorptive action of the gases and dust appeared characterized as a summation of their effects, and it is recommended that the maximum permissible level of total concentrations should not be set above 0.76 for evaluating the degree of daily atmospheric pollution.

1964

33457 **APTIC NO. 57048**

Stefanini, U.

ZN CONTENT OF THE MATERNAL AND FETAL SERUM AND OF THE PLACENTA IN FULL TERM PREGNANCY. *(Sul contenuto in zinco del siero materno e fetale e della placenta nella gravidanza normale in termine). Ann. Oster. Ginecol., vol. 86:771-775, 1964. 15 refs. Translated from Italian, 7p.*

The zinc content of maternal and fetal serum and the placenta during full term pregnancy was determined photometrically in ten cases of normal, full term pregnancies in order to further elucidate the exact role of the metal in human physiological processes. The normal level of Zn in an adult human is approximately 2 g, and sharp decreases in the serum levels of the metal have been previously associated with several pathological conditions, including hepatic cirrhosis and pernicious anemia. A higher than normal level of Zn found in the fetal serum during the tests can most likely be attributed to the high metabolic activity of the fetus. The latter is most probably born with sizable reserves of the metal in the absence of which deficiency phenomena appear. A rather high level of the metal in the placenta may indicate the storage of Zn in the mother s body in order to satisfy the high metabolic needs of the fetus.

1958

33458 **APTIC NO. 57085**

Nakayama, Masako

STATISTICAL OBSERVATIONS ON THE RELATIONSHIP BETWEEN TRACHOMA IN SCHOOLCHILDREN AND DEPOSITED ATMOSPHERIC IMPURITIES IN AN INDUSTRIAL CITY. PART 3: RELATIONSHIP BETWEEN TRACHOMA IN SCHOOLCHILDREN AND DEPOSITED ATMOSPHERIC IMPURITIES IN UBE CITY FOR THE PAST EIGHT YEARS. *(Sangyo toshi no koka baijin to gakudo torakoma to no kankei, daisanpen: kako 8 kanenkan ni okeru Ube-shi gakudo torakoma rikanritsu no ekigakuteki tokusei to koka baijin to no kankei). Yamaguchi Idai Sangyo Igaku Kenkyusho Nenpo (Ann. Report Res. Inst. Ind. Med., Yamaguchi Med. School, vol. 6:65-71, 1958. 42 refs. Translated from Japanese, 35p.*

A statistical and epidemiological investigation was performed on the relationship between trachoma in schoolchildren and deposited atmospheric impurities in the industrial city of Ube. The city is generally filthy due to its nearness to smoke emissions, and more than 70% of the inhabitants in this coal workers district use oval briquettes and coal for heating and cooking. The regional differences of trachoma morbidity rate in schoolchildren were found to be in rank correlation with the population density, the mining population ratio, and the amount of deposited atmospheric impurities (insoluble substance). The yearly fluctuation of the trachoma morbidity rate and that of the amount of deposited atmospheric pollution were found to be quite equal. The high trachoma morbidity rate for this area appear to be closely related to the environmental specifics of the city.

33459 **APTIC NO. 57086**

Nakayama, Masako

STATISTICAL OBSERVATIONS ON THE RELATIONSHIP BETWEEN TRACHOMA IN SCHOOLCHILDREN AND DEPOSITED ATMOSPHERIC IMPURITIES IN AN INDUSTRIAL CITY. PART 2: STUDIES ON THE EPIDEMIOLOGICAL CHARACTERISTICS OF TRACHOMA IN SCHOOLCHILDREN IN UBE CITY FOR THE PAST EIGHT YEARS, CLASSIFIED BY SYMPTOMS. *(Sangyo toshi no koka baijin to gakudo torakoma to no kankei, dainihen: kako 8 kanenkan ni okeru shojobetsu ni mita Ube-shi gakudo torakoma rikanritsu no shocho to sono ekigakuteki tokusei). Yamaguchi Idai Sangyo Igaku Kenkyusho Nenpo (Ann Report Res Inst. Ind. Med. Yamaguchi Med. School, vol. 6:60-64, 1958. 4 refs. Translated from Japanese, 24p.*

A statistical and epidemiological study was made on the results of group treatment for the last eight years in relation to the trachoma morbidity rate (classified by symptoms) of school children in the city of Ube. The rate of trachoma morbidity was found to have decreased steadily over the treatment period, but at a rate less than that for the 4 former and 4 latter years. Both severe and light trachoma cases decreased in absolute and relative fashion, but false cases were found to have increased relatively. While there are a number of cases of complete or temporary recovery resulting from group treatment, there also are a number of relapse cases or an outbreak of new cases related to the living environment of the city, and especially to the deposition of atmospheric impurities in this coal workers district.

33460 **APTIC NO. 57087**

Nakayama, Masako

STATISTICAL OBSERVATIONS ON THE RELATIONSHIP BETWEEN TRACHOMA IN SCHOOLCHILDREN AND DEPOSITED ATMOSPHERIC IMPURITIES IN AN INDUSTRIAL CITY (EFFECTS OF EXPOSURE TO AIR POLLUTANTS ON COMMUNITY HEALTH, REPORT 5). PART 1: STUDIES ON THE INCIDENCE OF TRACHOMA AND ITS EPIDEMIOLOGICAL CHARACTERISTICS IN SCHOOLCHILDREN IN UBE CITY FOR THE PAST EIGHT YEARS. *(Sangyo toshi no koka baijin to gakudo torakoma to no kankei (Shimin no hoken ni oyobosu taiki osen no eikyo ni kansuru kenkyu, sono 5), daiippen: kako 8 kanenkan ni okeru Ube-shi gakudo torakoma no shocho to sono ekigakuteki tokusei). Yamaguchi Idai Sangyo Igaku Kenkyusho Nenpo (Ann. Report Res. Inst. Ind. Med., Yamaguchi Med. School, vol. 6:51-59, 1958. 23 refs. Translated from Japanese, 43p.*

The incidence of trachoma in elementary school and junior high schoolchildren of Ube City, a newly developed industrial coal mining center, was compared by statistical epidemiology with the pertinent literature on changes of the trachoma morbidity rate in elementary schoolchildren of Niigata City, a relatively old industrial center. The trachoma morbidity rate among all of the schoolchildren in Ube was found to be higher than that for the contrast city, Niigata, and the steady diminution rate for the past seven years was determined to be lower. Differences between sexes were scarcely observed for Ube children, while a slightly higher trachoma morbidity rate existed for female children in the contrast city. A gradual increase in the morbidity rate curve according to grade level was observed for both cities. Similar tendencies were observed for both cities regarding regional and school district differences in morbidity. The two cities were distinguished by differences in the degree of trachoma symptoms and differences in the determining criteria of diagnosis and treatment of trachoma.

33461 **APTIC NO. 57081**

Nose, Yoshikatsu, Yoshio Kitagawa, Sekio Ueno, and Shoichi Hirose

STUDIES ON THE SUSPENDED ATMOSPHERIC POLLUTION IN UBE CITY. PART 2: NOTES ON THE RELATIONSHIP BETWEEN SUSPENDED AND DEPOSITED ATMOSPHERIC POLLUTION AND DEATH TOLL. *(Ube-shi no fuyu baijin ni kansuru kenkyu, dainehen: fuyu baijin narabi ni koka baijin to shiboshusu to no kankei). Yamaguchi Idai Sangyo Igaku Kenkyusho Nenpo (Ann. Report Res. Inst. Ind. Med., Yamaguchi Med. School, vol. 6:33-37, 1958. 9 refs. Translated from Japanese, 18p.*

The relationships between the monthly variations of suspended dust and sulfur dioxide concentrations in the atmosphere, observed continually for one week of every month between Sept. 1957 and Sept. 1958 from the roof of an office building in the center of Ube city, and the consumption of fuel coal by major users, as well as meteorological conditions were investigated. A study of the relationships between suspended dust and SO2 concentrations and the number of deaths occurring on measurement days followed. The results indicated that the monthly variation of monthly-averaged SO2 concentration did not always run parallel to the suspended dust concentration, and its relations to the coal consumption and temperature were considerably less than to wind velocity and direction. SO2 concentrations did run parallel to the amount of sulfur trioxide in the dust fall, however. A significant positive correlation was viewed on an all season basis for daily suspended dust concentration and SO2 concentration and the number of deaths, but the correlation existed only during the cold weather periods at a statistically significant level. Cold weather periods correlate with high air pollution (the suspended dust concentration being in direct proportion to the SO2 concentration); and this implies an association between high pollution activity and mortality.

33462 **APTIC NO. 57083**

Nose, Yoshikatsu, Sekio Ueno, Shoichi Hirose, and Hiroshi Ogawa

INTERRELATIONSHIP BETWEEN THE TREND OF COMMUNITY HEALTH AND LIVING ENVIRONMENT IN A COAL-MINERS HOUSING AREA OF UBE CITY. PART 2. NOTES ON THE TREND OF COMMUNITY HEALTH IN A COAL-MINERS HOUSING AREA AND ITS CHARACTERISTIC FEATURES. *(Ube-shi botan juchiiki shimin no hoken doko to seikatsu kankyo tono kankei, dainihen: Botanju chiiki jumin no hoken doko to sono tokusei). Yamaguchi Idai Sangyo Igaku Kenkyusho Nenpo (Ann. Report Res. Inst. Ind. Med., Yamaguchi Med. School), vol. 6:46-50, 1958. 14 refs. Translated from Japanese, 24p.*

A study was undertaken of community health and living environment in a coal-miners housing area of Ube City where the amount of deposited atmospheric impurities is considerable. Community health differed from that of the other inhabitants of the old city area; and dysentery, diphtheria, and trachoma were found frequently. Bone development in infants of the housing area was found inferior to that of other areas, and many cases of bronchial asthma were observed in infants. The coal miners area also showed a higher rate among diseases found responsible for high death rates of the inhabitants in general, i.e., pneumonia, bronchitis, heart disease, and accidental death. There appears to be considerable interrelation between these health factors and the environmental factors of overcrowding, underhousing, heavy deposition of atmospheric impurities, and the like which are peculiar to this area. (Author conclusions modified)

1952

33463 **APTIC NO. 57019**

Beijers, J. A.

LEAD POISONING. *(Loodvergiftiging). Tijdschr. Diergeneesk., 77(587-605, 1952. Translated from Dutch, 30p.*

Three cases of acute lead poisoning of cattle herds via ingestion are reported, and reference is made to several other incidents of lead in both humans and animals. The quantity of lead which was found in the livers of the dead cows varied from 6.5 to 19 mg/kg, while 1160 mg/kg of lead in the liver was found for a young cow which was poisoned experimentally with 5 gms of lead acetate per day; hence, there appears to be great variability in the amounts deposited that can lead to intoxication and death. No evidence was found for a lead seam around the teeth, prophyrinuria, or basophil granules in the erythrocytes during acute or chronic lead poisoning of cattle or horses examined. Reference is made to attempts of finding the boundary line between increased lead absorption and lead intoxication in humans, and an examination of 60 laborers in an offset-printing office containing a great deal of inhalable lead (0.16-1.9 mg/cu m air) is reviewed. Physical deviation, basophylic granulation of erythrocytes, increased lead content of the urine, and porphyrinuria only indicate an increased absorption of lead; the use of the term intoxication is justified if, in addition, there are complaints of lack of appetite, constipation, fatigue, abdominal pain, and emaciation.

1931

33464 **APTIC NO. 57061**

Flury, Ferdinand and Franz Zernik

HARMFUL GASES VAPORS, FOG, SMOKE AND DUST VARIETIES. *(Schadliche Gase Dampfe, Nebel, Rauch- und Staubarten). Berlin, West Germany, Julius Springer Publishing House, 1931, p. 117-121 and 125-128, 34 refs. Translated from German, 28p.*

The physical properties, nature of toxicity, poisoning source possibilities, poisoning symptomotology, tolerance effect, method of therapy, methods of analysis and toxic concentration range are presented for the gases chlorine, chlorine dioxide, and hydrogen chloride as related to both human and animal exposure. Chlorine, which occurs in manufacturing chloride of lime and other chemicals or during processes of bleaching or disinfection, has a strong irritating effect to the upper and lower respiratory tracts. It is almost twenty times as toxic as hydrogen chloride which occurs during the manufacture of hydrochloric acid, soda, Cl2, sulfate, stannic salt, artificial fertilizer, rubber products ceramics, and various other materials. Chlorine also has a far greater effect upon the respiratory tracts. Dangerous short-term human exposures for Cl2 and hydrogen chloride are 0.12-0.18 mg/l and 1.5-3.0 mg/l respectively. Chlorine dioxide which can develop after the disintegration of magnesium flash cartridges used for picture taking is even more irritating and toxic than Cl2 gas. Determination can be performed by passing through potassium iodide solution and titration of the iodine after addition of H2SO4.

1909

33465 **APTIC NO. 57024**

Ronzani, E.

ON THE EFFECT OF INHALATIONS OF IRRITANT INDUSTRIAL GASES ON THE PROTECTIVE ABILITIES OF THE SYSTEM WITH RESPECT TO INFECTIOUS DISEASES. *(Ueber den Einfluss der Einatmugen von reizenden Gasen der Industrien auf die Schutzkrafte des Organismus gegenueber den infektiven Krankheiten). Arch. Hyg. Bakteriol. (Munich), vol. 70:217-233, 1909. Translated from German, 20p.*

Rabbits, guinea pigs and doves were exposed to hydrofluoric acid gas for extended periods of time at concentrations of 0.01%, following preliminary examinations at higher levels with other animals of the same kind, in order to examine the overall effects of the gas as well as the effects of its inhalation on immunological mechanisms. Autopsies, histological examinations, and serum tests were performed subsequent to exposure. The extended inhalations were found to cause death in a significant number of animals with symptoms of catarrhal bronchopneumonitis, interstitial pneumonitis, and marasmus. Animals which survived experienced severe lesions of the lungs, severe anemia, and weight loss up to 23.2%. Experimental animals also produced considerably less agglutinating substances than control animals; and among animals immunized for typhus, those exposed to inhalations showed a sharp decrease in the production of specific antibodies. Bacteriocidal studies using B. prodigiosi showed considerable weakening of the lungs capability to destroy such microorganisms in the face of Hf inhalation.

EFFECTS-PLANTS AND LIVESTOCK

1973

33466 **APTIC NO. 55443**

Crecelius, Eric A. and David Z. Piper

PARTICULATE LEAD CONTAMINATION RECORDED IN SEDIMENTARY CORES FROM LAKE WASHINGTON, SEATTLE. *Environ. Sci. Technol., 7(11):1053-1055, Nov. 1973. 16 refs.*

The relative contribution of lead to the environment by autos and smelter and the relative change in the overall level of Pb pollution from 1880 to the present in the Seattle area was evaluated. The lead concentration in two sediment cores from Lake Washington was analyzed by atomic absorption spectrophotometry. Lead and copper analyses of the fir needles, which represented first and second year growth only, also were measured by atomic absorption. Within these cores, the Pb concentration exhibited an increase from about 25 ppm at the 30-50 cm depth to about 400 ppm in near surface sediment. The substantial increase in Pb above 30 cm was not continuous, but exhibited a subminimum near the 17 cm depth. The concentration of 400 ppm in the surface sediment represents a 20-fold increase over that measured in the deepest sediment analyzed from these cores. Variations of Pb and Cu in fir needles of a single tree and between adjacent trees were as much as 75%. The reason for these variations have not yet been determined. The increase in Pb in the sediments parallels the increase in population of the surrounding land. The two major sources of Pb are believed to be particulate Pb from the Tacoma smelter (from 1890 to 1913) and automobile gasoline additives (from 1920 to the present). Author conclusions modified)

33467 **APTIC NO. 55348**

Gish, Charles D. and Robert E. Christensen

CADMIUM, NICKEL, LEAD, AND ZINC IN EARTHWORMS FROM ROADSIDE SOIL. *Environ. Sci. Technol., 7(11):1060-1062, Nov. 1973. 16 refs.*

Residues of heavy metals in earthworms and soils were compared with distance from roadway and traffic volume. Cadmium, nickel, lead, and zinc in soils and earthworms along two Maryland highways decreased with increasing distance (10, 20, 40, 80, and 160 ft) from the roadway. Metals were quantified by atomic absorption spectrophotometry. Metal residues were higher at the location each highway where traffic volume was greater. Correlations between residues in earthworms and soil decreased with decreasing atomic weights (Pb greater than Cd greater than Zn greater than Ni). Metal residues in soils were positively correlated with quantities of soil organic matter. Earthworms accumulated up to 331.4 ppm of Pb and 670.0 ppm of Zn concentrations which may be lethal to earthworm-eating animals. (Author abstract modified)

33468 **APTIC NO. 55654**

Keller, Theodor

THE PHYTOTOXICITY OF PARTICULATE FLUORINE COMPOUNDS. *(Zur Phytotoxizitaet staubfoermiger Fluor-Verbindungen). Text in German. Staub, Reinhaltung Luft, 33(10):395-397, Oct. 1973. 8 refs.*

The toxicity of particulate fluorides was tested on 3-year old pot-bound pines (pinus silvestris), on 4-year old douglas firs (psuedotsuga menziesii), and on 1-year old birches (betula verrucosa). The first series of experiments was used for determination of the toxicity of more or less water insoluble fluorine compounds at high humidity. Thye pines were therefore exposed in two different greenhouses. One was normally ventilated, the other had a relative humidity of 75% and more at all times. With the second test series the plants were exposed under outdoor conditions. The effect of the dusts on photosynthesis was statistically not significant in the absence of visible injury. This may be due to the anatomical feature of conifer needles and may be valid for particulate fluoride only.

33469 **APTIC NO. 55410**

Koiwai, Akira and Takuro Kisaki

MIXED FUNCTION OXIDASE INHIBITORS PROTECT PLANTS FROM OZONE INJURY. *Agr. Biol. Chem., 37(10):2449-2550, 1973. 9 refs.*

The effect of mixed function oxidase inhibitors such as SKF 525-A (2-diethylaminoethyl-2,2-diphenyl valerate, DPEA (2,4-dichloro-6-phenylphenoxyethyldiethylamine), DPDA (2,4-dichloro-6-phenylphenoxyethyldiethylamine, and piperonyl butoxide on ozone injury to tobacco plants fumigated in an ozone chamber was investigated. The SKF 525-A and DPDA protected leaves by nearly 70%, whereas DPEA was less effective. The protection was nearly proportional to the applied concentrations of the chemicals. The DPDA at 10 mM gave 70 and 80% protection against 50 pphm for 2 hr and 35 pphm for 2 hr of ozone, respectively. The SKF 525-A was less effective than DPDA. The protection rate always showed a higher value against a lower ozone dose than a higher dose. Piperonyl butoxide was the most effective, giving nearly 100% protection against ozone levels ranging from 30 to 50 pphm over time periods of 1-2 hr. The results suggest that ozone may attack plants through excessive oxidation in some mixed function oxidase-like system(s) including lipid oxidation.

33470 **APTIC NO. 55770**

Nishino, O., M. Arai, I. Senda, and K. Kubota

INFLUENCE OF ENVIRONMENTAL POLLUTION ON THE SPARROW. *(Kankyo osen no suzume ni oyobosu eikyo). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan J. Public Health), 20(10), 1p., Oct. 1973. (Presented at the Japan. Society of Public Health, Annual Meeting, 20th, 1973, Paper 478.)*

To examine the possibility whether sparrows could be used as the index of pollution by heavy metals, sparrows were caught in a cadmium polluted area near a refinery, and in two areas where the itai-itai disease occurred. Five sparrow livers from each polluted area were studied for Cd, mercury, zinc, copper, and lead, and then compared to livers from control sparrows. The values obtained near the refinery were 3.1, 0.1, 14.3, 2.7 ppm, and N. D., respectively. Values obtained in the itai-itai disease area were 1.8-1.6, 0.2-0.2, 8.1-10.7, 2.6-2.0 ppm and N. D., respectively. Average values for the control areas were 0.47, 0.1, 9.5, 2.4, and N. D. ppm, respectively. The average value of Cd in the polluted areas were 2.2 ppm, which is significantly higher than the 0.47 ppm average of the unpolluted areas. Cadmium values in unpolished rice were lower in the refinery area in actuality, whereas the analysis of Cd in the sparrow livers showed a higher content than in the areas of itai-itai disease, because the birds are easily influenced by Cd in the air. Mercury resulting from residual fungicide pollution showed no difference in the sparrows from polluted or control areas. The sparrow can be used as the pollution index because of its short life and its sensitivity to heavy metals.

33471 **APTIC NO. 57018**

Odaira, T., T. Sawada, T. Komeiji, I. Nouchi, K. Oguchi, K. Negishi, M. Iwanami, and T. Asaka

DAMAGE TO VEGETATION WHEN EXPOSED TO OZONE AND HIGH OXIDANT CONCENTRATIONS. *Tokyo-To Kogai Kenkyusho-ho (Ann. Rept. Tokyo Metropol. Res. Inst. Environ. Protection) 1973. 8 refs. Translated from Japanese, p. 25-35.*

Ozone exposure tests on 15 herbaceous plant species and eight woody plant species were conducted in twin artificial meteorological rooms with temperature and humidity control equipment in order to examine plant damage at high oxidant concentrations (20 plus or minus 5 pphm ozone). Woody plants were found to be generally more resistant to ozone than herbaceous plants, and resistance varied depending on the stage of growth. Brassica rapa, B. Pekinensis, soybean, and alfalfa showed the weakest resistance among the herbaceous species, while cauliflower, Welsh onion, and corn showed the strongest resistance. Poplar was found to be the least resistant among woody plants, while deodar and maidenhair tree exhibited much stronger resistance. The most conspicuous leaf injury symptoms for herbaceous plants were leaf flecks of the bleaching type. Small grey-brownish or dark brown flecks were observed on soybean leaves; and morning glory leaf damage was rather complex, a change having developed in the color-producing system on the surface of the leaves 20-30 days after ozone exposure. Leaf injury symptoms for woody plants appeared as dark brown or red-brownish flecks on full-grown leaves of trees such as poplar, Zelkova serrata, and platanus; while another type of leaf injury was observed in the case of the cherry tree where the leaf surface turned yellow. The fact that certain types of field damage could not be produced by ozone alone points to the need for further examination of the effects on plants of simple substances of various atmospheric pollutants. (Author summary modified)

1972

33472
APTIC NO. 57035

Godzik, Stefan

COMPARATIVE INVESTIGATIONS ON UPTAKE OF SULFUR DIOXIDE FROM THE ATMOSPHERE BY CERTAIN SPECIES OF THE GENUS PINUS. *(Verglechende untersuchungen ueber die aufnahme von schwefeldioxyd aus der atmosphaere durch einige arten der gattung pinus). Mitt. Forst. Bundesvers., 97:319,334, 1972. 18 refs. Translated from German, 18p. (Presented at the International Symposium of Forest Fume Damage Experts, 7th, Essen, West Germany, Sept. 7-11, 1970.)*

Investigations were performed to determine the uptake of sulfur dioxide from external air by needles of varying ages from selected pine species and to determine the content of absorbed SO2 in different needle parts. The tests were performed in a hermetically sealed chamber on detached shoots of Pinus sylvestris, P. rigida, P. nigra, P. strobus, and P. montana. The plant material came from a place with slight air pollution caused by dust and sulfur compounds. The detached shoots were treated with low concentrations of labelled SO2 (about 0.2 ppm) with continuous air through-flow. The degree of radioactivity of the one-year needles was the measure for the SO2 uptake; and the results were expressed by reference to the dry matter, respiration rate, and chlorophyll content of the individual species. Statistical analysis of the results revealed significant differences in the amount of SO2 taken up by the needles of different species and between individual needles of the same species. Comparison between quantity of SO2 uptake and the chlorophyll content (and/or respiration intensity) showed no relation among the results. A distinct accumulation of labelled SO2 was observed in the tip zones of Pinus sylvestris needles, and the uptake of SO2 appeared to be largely dependent on physical and chemical qualities of the plant tissue rather than the vital processes. The quantity of an absorbed toxic substance (SO2) is not the only cause of varying sensitivity among plants of a single genus. Data are presented for the radioactivity, chlorophyll content, and respiratory intensity of the experimental pinus species. (Author summary modified)

33473
APTIC NO. 57022

Sierpinski, Z.

THE SIGNIFICANCE OF SECONDARY PINE PARASITES IN AREAS OF CHRONIC EXPOSURE TO INDUSTRIAL POLLUTION. *(Die Bedeutung der sekundaeren Kiefernschaedlinge in Gebieten chronischer Einwirkung industrieller Luftverunreinigungen). Mitt. Forst. Bundesvers., vol. 97, p. 609-615, 1972. Translated from German, 9p.*

Investigations and observations conducted in forested areas of Poland within range of industrial air pollutant exposure have shown that insects of the secondary parasite group are of great economical significance and can decide the mortality of the trees. Pine stands under the chronic effect of industrial emissions have their treetops weakened, and numerous hatching parasites are found under the thin bark of the top and branches. The parasite contributes to the thinning out of the stands and hence to the wind damage and more intensive penetration by industrial emissions into the lower forest layers and the soil. Two groups of secondary parasites have appeared that are clearly distinct from each other. The first group includes the blue pine beetle, the pine trunk beetle, and the blue spruce wood wasp and occurs most frequently in strongly thinned out stands at the edge of forests near industrial plants. The second group includes the large forest gardner, the room longicorn beetle, the pincer longicorn beetle, and the common timber bark beetle. The latter settle in denser stands not exposed to industrial emissions. Even a weak attack by parasites can cause mortality due to the very low resistance of the trees in areas chronically exposed to industrial flue gases and smokes.

1971

33474
APTIC NO. 55472

Fukushima, Kuniaki

CADMIUM IN VARIOUS FOOD PRODUCTS. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 11 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 56-63, April 1973.*

The cadmium concentrations in 340 samples of food products marketed in Kanzawa City, Japan are reported in terms of net sample weight, per 2400 calories, and per 70 grams of protein. The results indicate that mollusks, internal organs, and colored vegetables contain considerably more cd than does rice, that processed food tend to contain more cd than unprocessed foods, and that ocean fish contain more cd than river fish. The estimated daily cd intake per person is a little less than 50 micrograms, calculated on the basis of the average cd concentrations in the food products; this figure is compared to similar figures for persons in the United States and Germany. The average cd intake of a farm worker in an itai-itai region is estimated to be over 700 to 800 micrograms.

33475
APTIC NO. 55513

Holden, H.

MEASUREMENTS OF AIR POLLUTION IN PRESCOT. *Preprint, National Society for Clean Air, Brighton, England, 4p., 1971. (Presented at the National Society for Clean Air Conference, Folkestone, England, Nov. 2-5, 1971.)*

The activities of a Pollution Panel in Prescot, England, which collected data on air pollution inside and outside a factory complex are described. Six monitoring stations were set in schools in a radius of 1 mi from the factory. The students assisted in the continuous monitoring and analysis of sulfur dioxide, solid particles, and metals as copper, cadmium, zinc, and lead. A local brook which passes through a park and acts as a receptable for industrial waste was surveyed. Mosses were a good indicator or Pb and Cd levels. Data are presented on moss analysis for Pb and Cd in the countryside, in London, and in Scotland. Concentrations of Pb were exceptionally high (2314 ppm) in London, compared to 91 ppm in the Scotland countryside.

33476
APTIC NO. 57068

Miroshnikova, A. T. and V. S. Nikolayevskiy

NEW BIOPHYSICAL METHODS FOR DETERMINING THE GAS TOLERANCE OF PLANTS. *(Novyye biofizicheskiye metody diagnostiki gazoustoychivosti* *rasteniy). Uch. Zap., Perm. Gos. Univ., no. 256:197-210, 1971. 11 refs. Translated from Russian, 23p.*

The possibility of using biochemiluminescence methods for studying the gas tolerance of plants in connection with determining admissible norms of atmospheric contamination was investigated. It was established that a quantometric apparatus with registry of phosphorescence under the influence of an excess quantity of a solution of potassium permanganate can be used for determining the quantity of oxidizable substances in plants, though the method requires further work. The intensity of electrochemiluminescence of a filtrate of green leaves of plants was found to be proportional to the damageability of them by acidic gases; and under the influence of chlorine, plants exhibited a change in electrochemiluminescence of the filtrate, correlating with gas tolerance. Phosphorescence was increased in tolerant species, whereas in nontolerant it was reduced. The nature of change in the fluorescence of the filtrate of leaves under the influence of chlorine, like the intensity of phosphorescence from undamaged leaves after photosynthesis (15 min or more) was found to characterize the degree of gas tolerance of plants, and the intensity of autolysis in homogenates of leaves was found greater in nontolerant species.

33477 APTIC NO. 57094

Nikolayevskiy, V. S., V. V. Finger, and L. M. Belokrylova

LIGHT METABOLISM OF CARBON-14 IN ORNAMENTAL PLANTS AND ITS ROLE IN GAS TOLERANCE. *(Svetovoy metabolizm ugleroda-14 u dekorativnykh rasteniy i ego rol v gazoustoychivosti). Uch. Zap., Perm Gos Univ., no. 256:55-92, 1971. 26 refs. Translated from Russian, 55p.*

Radiochemical and radiochromatographic analyses of ornamental plants exposed to sulfur gas have confirmed the dependence of the degree of plant damage by sulfur gas on the intensity of gas exchange, and accordingly, the rate of absorption of the toxic gas and formation of lethal concentration in leaves. Differences were established in the metabolism of radiocarbon in groups of woody plants and individual species with respect to gas tolerance. The importance of alternative synthesis mechanisms in tolerant species was found to be relatively high. Sulfur gas caused an activation of photosynthesis in a tolerant species (ash-leaf maple), whereas suppression was the result in a nontolerant species (birch, barberry). Sulfur dioxide caused a slowing of the polymerization of organic compounds. Shifts in the C(14) metabolism in plants under the influence of SO2 were associated with a variable intensification of first the carbohydrate and then the alternative synthesis mechanisms. Sulfur gas caused a nonspecific fluctuating change in the distribution of radiocarbon and an intensification of the polymerization of organic compounds in lawn plants, and some differences in the mechanisms of carbon (14) dioxide bonding were discovered in two studied species under the influence of SO2. (Author summary modified)

33478 APTIC NO. 57039

Rogalinski, K. and Z. Muszynski

FORESTS SITUATED IN THE ZONE OF THE NOXIOUS ACTION OF INDUSTRIAL GASES AND DUSTS IN THE AREA OF BRYNICA AND ZYGLINEK. *(Lasy znajdujase sie w strefie szkodliwego oddzialywania gazow i pylow przemyslowych okolic brynicy i zyglinek). Ministry of Forestry and Timber Industry, Cracow (Poland), Commission for Forest Administration and Replanting in Industrial Districts. 4(23), 1971. Translated from Polish, 36p.*

A detailed inventory has been made of forests situated in Brynica and Zyglinek which are within reach of industrial emissions of dusts and gaseous pollutants. Data were collected on forest abode types, climate, geology, soil type, and health condition of the trees. Installation of a zinc works and a sulfuric acid factory in the area investigated appears to have resulted in a marked increase in the amount of deadwood found, especially in the northern part of the forest complex. Mineral dusts of silica, magnesium oxide, and calcium oxide have covered large sections of the edge of tree stands, and sulfur dioxide emissions from the sulfuric acid factory have resulted in considerable destruction of nearby orchards as well as complete browning of pine needles in sections of the stands. The assimilation apparatus of leafy trees encircling the factory has also been subjected to destruction. The presence of harassing pests is also indicative of the weakened condition of the forests within range of the noxious industrial emissions. The average timber reserve in cu m/ha has dropped considerably and was found to range from 150-68 cu m/ha.

33479 APTIC NO. 55469

Yamagata, Noboru

ENVIRONMENTAL SAMPLING AND MEASUREMENT METHODS. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. 5 refs. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 8-16, April 1973.*

Methods for the sampling and analysis of environmental cadmium are discussed. The procedure used in measuring the cd content of soil or harvested rice is used as an example. The processes involved include object (e.g., rice paddy) selection, on-site sampling, laboratory sampling, chemical preprocessing, and equipment analysis. For a paddy covering about 10 acres, it is sufficient to sample the surface soil at about 10 points and to analyze a well-mixed sample; it is advisable to sample sections below 70 micron in the analysis of bottom material. If the goal is to estimate the degree of rice pollution from the results of soil analysis, the extraction of soil water and extraction with pH 7 ammonium acetate are recommended. Sixty kilogram samples of unhulled rice from both Yamagata and Toyama Prefectures were prepared as standard samples, since both samples naturally contain cd. To determine the reliability of the atomic absorption photometer in the analysis, nine different kinds of photometers made by five different companies were used to measure the sample solution. One of the standard rice samples was analyzed by the APDC-chloroform method and the low-temperature ashing-acid extraction method. The fluctuation rate of analytical values with the wet ash-solvent extraction method is about 10%. The reliability of measurement using the atomic absorption method increases if measurements at the low concentration region near the base point are avoided. It also increases if the chemical preprocessing is simplified and the low-temperature ashing-acid extraction method is adopted. It is more effective to simplify the preprocessing considering production and distribution of standard samples than to standardize the analytical methods by specifying the choice among solvent extraction methods.

33480 APTIC NO. 55470

Yamamoto, Yoshimasa

PRESENT STATUS OF CADMIUM ENVIRONMENTAL POLLUTION. *Japan Public Health Assoc., Proc. Sci. Res. Meet. Itai-Itai Dis. Cadmium Poisoning, Tokyo, Japan, 1971. (Aug. 28-29.) Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., p. 16-32, April 1973.*

A survey of 50 regions in the vicinity of zinc mines or refineries was undertaken to provide information on the nature of cadmium pollution in regions other than those in which itai-itai disease had been observed. The maximum cd concentration, maximum average regional cd concentration, and general average cd concentration are given for the unhulled rice, paddy field soil, drinking water, river and sea water, drainage water, river bottom soil, agricultural products other than rice, fish, shellfish, and seaweed in the regions surveyed. The maximum cd concentration in the ambient air was 2.59 micrograms/cu m; the maximum average regional concentration was 0.04 micrograms/cu m; and the general average value was 0.04

micrograms/cu m. The number of samples exceeding 0.88 micrograms/cu m was three; they were in the Hikoshima and Omuta regions. The relationship between the cadmium concentration in unhulled rice and that in the paddy soil is shown by the equation y equals 0.031x + 0.125, where x is the cd concentration in the soil and y is that in the rice (in ppm). Survey results are also given of 1146 rice samples grown in seven regions requiring environmental observation because of known cd pollution.

33481 **APTIC NO. 57069**

Yatsenko, V. M., V. S. Nikolayevskiy, and T. N. Kuznetsova

EFFECT OF MINERAL AND EXTRAROOT NUTRITION ON SOME PHYSIOLOGICAL- BIOCHEMICAL CHARACTERISTICS AND GAS TOLERANCE OF LAWN GRASSES. *(Vliyaniye mineral nogo i nekornevogo pitaniya na nekotoryye fiziologo-biokhimicheskiye osobennosti i gazoustoychivost gazonnykh trav). Uch. Zap., Perm. Gos. Univ., no. 256:159-176, 1971. 5 refs. Translated from Russian, 24p.*

Investigations were performed on the damageability of lawn grasses by sulfur gases such as sulfur dioxide and on the effect of mineral and extraroot nutrition on their gas tolerance. The content of oxidizable substances (water-insoluble fraction and total content) in the leaves of lawn grasses and fescue correlated by phases of growth with the damageability under the influence of fertilizers was unrelated to a change in the quantity of oxidizable substances, ascorbic acid, redox potential, and aerobicity index. Phosphorus exerted a positive influence on the gas tolerance of lawn grasses during the second year, whereas nitrogen phosphates exerted a positive effect on the gas tolerance of fescue. Nitrogen gave a decrease in damageability in timothy with exposure to extraroot in the second year, and phosphorus did the same in fescue. The compounds exerted a less positive influence on the gas tolerance of fescue and a more positive influence on that of timothy after the first year of life. Use of monoiodoacetic acid confirmed the important role of the pentosomonophosphatic oxidation mechanism in respiration and gas tolerance of tolerant species and of the Krebs cycle in nontolerant species.

1970

33482 **APTIC NO. 55467**

Rohmeder, Von E. and E. Weber

POISONING OF SPRUCE BY AIRCRAFT EXHAUST GASES. *(Vergiftung von Fichten durch Flugzeugabgase). Text in German. Forstwiss. Zentralbl., vol. 89:335-339, 1970. 5 refs.*

Injuries to spruce trees of varying age located in a forest area 8 km east-northeast of Munich airport have been observed for several years and are attributed to the smoke emissions from overhead aircraft. The extent of the damage has ranged from red discoloration of needles to complete death of the trees, and chemical analysis of one and two year old needles has revealed a higher than normal lead content. Influences by insects and fungi have not been traced. The forest is situated underneath the flight path of arriving and departing airplanes, and on calm days a trail of black smoke is deposited onto the forest. It is probable that other substances such as unsaturated hydrocarbons in the aircraft emissions have also contributed to the damage of the spruce stands.

1962

33483 **APTIC NO. 57066**

Pavlicevic, M

THE OCCURRENCE OF LETHAL PARALYSIS IN YOUNG SHEEP AS A RESULT OF POISONING FROM FACTORY SMOKE. *(Pojava paraliza sa letalnim ishodom kod podmlatka ovaca dao posledica trovanja fabrickim dimom). Veterinarski Glasnik, vol. 11:1085-1088, 1962. 1 ref. Translated from Serbo-Croatian, 6p.*

Lead-containing factory smoke has been determined as the cause of lethal paralysis in young sheep. The poisonings were reported only in regions imperiled by factory smoke and occurred most frequently during the spring lambing period when the winds are of significance. Examination of the Pb content of the affected area showed a Pb content in the uppermost layer of the earth of 141 mg %; in addition, the milk of grazing sheep showed increasing amounts of Pb indicating the possibility of Pb introduction through pastureland. Affliction of the young sheep consisted of paralysis of the extremities, craw, tongue, and larynx, a rigidly held neck, and an anemic mucous membrane. Changes were also observed in the digestive tract and in respiratory organs.

1934

33484 **APTIC NO. 57046**

Weiler, A.

CORROSIVE DAMAGE ON FOLIAGE ORGANS CAUSED BY ACIDS AND TARRY SUBSTANCES. *(Durch Saeuren und teerige Stoffe hervorgerufene Aetzschaeden an Blattorganen). Phytopathol. Z., vol. 7:121-144, 1934. 18 refs. Translated from German, 40p.*

Numerous cases of corrosive damage to plant foliage caused by hygrophilic acids and tarry substances are presented. Sulfuric acid-laden soot particles from the smokestack of a factory caused spot damage to nearby plants, though the effects varied depending upon the type of plant investigated. Hydrochloric acid causes a peculiar ring formation on plant leaves, and the damage is not limited to the top side of the leaves. Both hydrochloric and H2SO4 diffuse into the needles of spruce, thereby killing assimilatory cells. Chlorine-caused white spots appeared on sugar beet leaves as a result of chlorophyll destruction. Dead cells were found in the vicinity of the stomata and lower down in the mesophyll. Corrosive damage caused by tarry substances is a black to brown discoloring resulting from the precipitation of tanning agents caused by basic substances in the cells of mesophyll or mesophyll and epidermis. The deposits first form in living cells in the shape of small balls, and eventually the cells die, with their contents solidified into compact masses. Coking plants are the most important source of tar damage to plants since their emissions contain all distillation products of bituminous coal in addition to soot.

EFFECTS-MATERIALS

1973

33485 **APTIC NO. 55714**

Bohnenkamp, Konrad, Gerda Burgmann, and Wilhelm Schwenk

INVESTIGATIONS OF THE ATMOSPHERIC CORROSION OF PLAIN CARBON AND LOW ALLOY STEELS IN INDUSTRY, COUNTRY, AND SEA AIR. *(Untersuchungen ueber die atmosphaerische Korrosion von unlegierten und niedriglegierten Staehlen in Meere-, Land und Industrieluft). Text in German. Stahl Eisen (Duesseldorf), 93(22):1054-1060, Oct. 25, 1973. [illegible] refs.*

Natural corrosion of three steels with 0.10, 0.18, and 0.27% copper in industry air and of a high-strength and weather-resistant steel and various unalloyed and low alloy steels in sea air, country air, and industrial air was studied. Regression analysis was used to study results.

33486 **APTIC NO. 55680**

Duncan, J. R., D. J. Spedding, and E. E. Wheeler

DISCRETE AREAS OF SO2 ADSORPTION FROM THE ATMOSPHERE ONTO IRON. *Corrosion Sci., 13(1):69-72, 1973. 15 refs.*

Adsorption of sulfur-35 dioxide from the atmosphere onto iron surfaces which were not visibly rusted at 70 or 95% relative humidity was studied. Autoradiographs of the samples showed major variations in the degree of uptake of sulfur dioxide over the metal surface, with most of the compound centered in specific areas up to 0.5 mm in diameter. Surface features large enough to cause these differences were not visible under the electron or light microscope. A possible explanation might involve fracture of the oxide layer at a submicroscopic point, allowing adsorption of the sulfur dioxide at a type of iron oxide different from that on the outside surface and repair of the oxide layer during normal growth, thus obscuring the imperfection from microscopic detection.

1972

33487 **APTIC NO. 55568**

Angert, L. G., R. M. Mavrina, and A. S. Kuz minskiy

REASONS FOR THE INCREASED OZONE RESISTANCE OF RUBBERS CONTAINING WAX AND AN ANTIOZONANT. *(Issledovaniya princhin povyshennoy ozonostoykosti rezin, soderzhashchikh vosk i antiozonant). Text in Russian. Kauchuh i Rezina, 31(2):19-21, 1972. 3 refs.*

Possible causes of the increased ozone resistance of rubbers containing wax and diaphen (N-phenyl-N prime -isopropyl-n-phenylene diamine) as an antiozonant were studied. The solubility of diaphen in ozokerite-60 and AF-1 was found to be higher by one order of magnitude than it is in paraffin. The quantity of diaphen on the rubber surface increased in the presence of waxes by two orders of magnitude, which appears to be one of the reasons for the increased ozone resistance of antiozonant-wax systems in rubbers. The migration of the antiozonant from the rubber into the wax film is due to the redistribution of the antiozonant between the wax and the rubber. The distribution coefficient of the antiozonant between the wax and the rubber was found to be constant for the given system within a temperature range of 25-50 C. Rapid migration of the antiozonant from the rubber into the wax film was observed. Distribution coefficients of diaphen between SKMS-30 RP rubber containing 40% carbon black and paraffin, ZV-1, ceresin-80, AF-1, and ozokerite-60 were determined.

EFFECTS-ECONOMIC

1973

33488 **APTIC NO. 55737**

Schulze, Richard H.

THE ECONOMICS OF ENVIRONMENTAL QUALITY MEASUREMENT. *J. Air Pollution Control Assoc., 23(8):671-675, Aug. 1973.*

The economics of monitoring the quality of air and water discharges are presented, and a rationale is suggested for deciding between the use of in-house versus service company capabilities. The topics covered include: analysis of the cost of personnel and supporting services, the cost of learning about laws and maintaining a current knowledge of them, the fees charged by service firms for air and water quality measurements, and some non-economic factors along with a suggested program for management. Cost comparisons are given for the use of in-house service versus service company for stack sampling and ambient air work. There appears to be an economic advantage to doing the work in-house for a firm that plans to do more than about $60,000/yr work per location; the service company should be used as an auditor. The use of a service company will almost invariably be more economical for a firm that does less than $20,000/yr.

33489 **APTIC NO. 55316**

Suzuki, Minoru

AN ANALYSIS OF THE 1972 PRODUCTION TREND OF POLLUTION CONTROL DEVICES (PART 1). *(Showa 47 nendo kogai boshi sochi no seisan jisseki no keiko bunseki (jo)). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 2(9):20-26, Sept. 1973.*

Questionnaires were sent to 217 industrial firms by the Japan Assoc. for Industrial and Mechanical Engineering, and responses were obtained from 193 firms, or 88.9% of the total number. There has been a remarkable increase trend in the demands for liquid waste treatment systems, but the annual spendings on air pollution control apparatus was 51.5% of the total spending on all areas of public nuisances in 1969, 43.3% in 1970, 41.5% in 71, and was only 35.4% in 1972. Of the total sale of air pollution control apparatus, $49,500,000, $1,381,480 were exported products, $26,400,000 were purchases by various government agencies, and the rest were purchases by private industries. The types of products sold were: 48.4%, dust collectors; 18.4%, desulfurization systems for heavy oil; 11.2%, for stack gas desulfurization systems; 9% for flue gas treatment systems; 6.9% for high stacks, and 6.1% for related apparatus. The total production of these air pollution control apparatus was only 6.4% over the previous year.

STANDARDS AND CRITERIA

1973

33490 **APTIC NO. 55375**

Japan Clean Air Assoc.

A PROPOSAL FOR CLEAN AIR EQUIPMENT PERFORMANCE TESTS. *(Kuki seijo sochi kentei seido yoko (an)). Text in Japanese. Kuki Seijo (Clean Air J. Japan Air Cleaning Assoc., Tokyo), 11(5):1-20, Oct. 1973. 18 refs.*

A proposal for standardizing performance tests for various air cleaning equipment was submitted by the Japan Clean Air Association in accordance with the October 1972 rulings concerning the protection of environmental air standards within buildings. The proposal includes the items to be given performance and quality tests, the methods for testing, application, the place and costs of tests, and the method of approval. The equipment to be tested are: air conditioning filters, prefilters, high efficiency particulate air filters (HEPA), static electric air cleaners, gas eliminaters, and the fan type air cleaners. The methods for calculating elimination rates for dusts and gas [illegible] presented by formulas; for gas, the elimination rate should [illegible]ng a result 10% + or of the standard air quality. The pass-failure limits are not given for any equipment. Design specifications for equipment and the details of test methods are discussed.

33491 **APTIC NO. 55383**

CONTROL OF AIR POLLUTION: HARMFUL SUBSTANCES IN THE AMBIENT AIR OF POPULATION CENTERS. *Intern. Digest Health Legislation, 24(2):269-270, 1973.*

A supplement to the 1970 table of maximum permissible concentrations of harmful substances in the ambient air of population centers is presented. They are nitric acid, acrolein, acetaldehyde, butyl alcohol, tributyl-triphosphate, vinyl acetate, dimethylaniline, dimethylamine, ethyl benzene, ethyleimine, iso-octyl alcohol, isopropyl alcohol, thiometon, mesidine, methylacrylate, methylene dichloride, monomethyl aniline, monoethylamine, naphthalene, nitrochlorobenzene (p and o), acetic acid, acetic anhydride, p-chloraniline, propyl alcohol, sulfuric acid (as hydrogen ion), carbon disulfide, hydrochloric acid, tetrachlorohydrofuran, triethylamine, tetrachloromethane, phthalic anhydride, hexachlorocyclohexane, m-chloroaniline, chlorofos, hydrocyanic acid, cyclohexane, and cyclohexanone oxime.

33492 **APTIC NO. 55426**

Committee for Industrial Test Powder Standardization

A REPORT ON A REVISION PLAN FOR THE INDUSTRIAL STANDARD Z 8901 TEST DUSTS. *(Shikenyo dasuto JIS Z 8901 kogyo hyojun kaiseian hokokusho). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 11(5):21-30, Oct. 1973.*

Some of the solid dust particles of more than 10 micron size that were designated as standard particulates for industrial tests were grossly inappropriate for conducting tests. After about a year of examination and reevaluation, the Committee for Industrial Test Powder Standardization recommended the addition of smaller size particles of talc, fly ash, Kanto rhomb(?), carbon black, aerosol, and mixed dusts, to the existing eight types of particulates. The specifications for all the test dusts, their chemical compositions, specific weights, the preparation methods, and examination methods are described. The revised table for the JIS dusts now include 14 types of test dusts of particles ranging from 0.3 to 297 micron.

33493 **APTIC NO. 55428**

SUGGESTIONS FOR THE MAXIMUM ALLOWABLE CONCENTRATION AND OTHER STANDARDS (1973). *(Kyoyo nodo-to no kankoku (1973)). Text in Japanese. Sangyo Igaku (Jap. J. Ind. Health), 15(3):50-64, May 1973.*

Recommendations are made for the operators and managers of various industries and work shops to use the table of maximum allowable concentration standards for various chemicals for regulating the work environment under their management. The table includes 94 chemicals, their chemical symbols, maximum allowable concentrations in ppm and mg/cu m, and the year the standards were established or revised. The standards do not take into consideration the degree of physical labor involved, the environmental temperature, air pressure, humidity, ultraviolet radiation and other types of radiation, noise, and vibration, which may coexist in the work environment and may affect the effects of the chemical concentration in the environment. The more recently revised standards include: acrolein, 0.1 ppm or 0.25 mg/cu m (1973); acetone, 200 ppm or 480 mg/cu m (1972); tetrachlorethylene, 50 ppm or 335 mg/cu m (1972); trichlorethylene, 50 ppm or 268 mg/cu m (1972); and benzene, 10 ppm or 32 mg/cu m (1972). These measurements are in an environmental condition of 25 C, air pressure of 1. As an appendix, a measurement method for dusts is discussed.

33494 **APTIC NO. 55583**

Ministry of International Trade and Industry, Tokyo (Japan)

LARGE-SIZE FACILITIES OF MINES TO BE SUBJECT TO NITROGEN OXIDE EMISSION CONTROL. *(Kozen no ogata nenshoshisetsu no taisho). Text in Japanese. Tsusansho Koho (Gaz. Minist. Int. Trade Ind.), no. 7142:6-8, Sept. 6, 1973.*

Effective Aug. 22, 1973, the 1973 Ordinance No. 63 of the Ministry of International Trade and Industry was partially revised to strengthen pollution control criteria applicable to mines. Based on this revision, metal and coal mines are now subject to nitrogen oxide emission controls. This revision has become necessary to comply with the new NOx emission criteria recently set up by the Japan Environmental Agency. According to the revision, a large-sized combustion facility of a smelting works or a coal mine whose emissions amount to 40-100 thousand cu m or more/hr (10-40 thousand cu m or more for a metal heating furnace) must comply with the new nitrogen oxide emission control criterion of 130-480 ppm or less. The control criterion is 170-750 ppm for those plants already in use until about two years later. The revision of the emission control criteria results in partial revisions of three related ordinances of the Ministry: the Ministerial ordinance specifying control criteria for prevention of mining pollution in mines is thus partially revised by Ordinance No. 77 effective Aug. 22, 1973; the safety regulations for metal mines revised by Ordinance No. 78 of the same date; and the safety regulations for coal mines revised by Ordinance No. 79 also of the same date.

33495 **APTIC NO. 55677**

A PROGRESS REPORT BY THE COMMITTEE ON NITROGEN OXIDES EMISSION STANDARDS REGULATION EVALUATION. *(Chisso sankabutsu haishutsu kisei kento iinkai chukan hokoku). Text in Japanese. Aromatikkusu (Aromatics), 25(8):8-16, 1973.*

Based on this progress report on the preliminary studies for the standardization of nitrogen oxides emissions, standards were to be determined by July 31, 1973 and enforced starting August 10. The air quality goal was to be 0.06 ppm/hr, or 0.02 ppm daily average, and the emission standard should be 60 ppm 120 ppm. However, assuming that the fuel consumption growth rate is approximately 10% a yr, the natural pollutant increase will be 1.6 times the present in 5 yr. Therefore, pollution must be decreased to at least 70% of the present emission rate. For polluted areas, the present 0.06 ppm pollution to be reduced in 8 yr to the quality goal will require approximately an 85% reduction of the present emission rate. For most areas, achievement of air quality goal in 5 yr will mean reduction of emissions to 90 ppm, and in 8 yr, to 45 ppm. However, considering geographical or topographical characteristics and maximum fuel consumption growth, the final goal for emission standards at the end of 8 hr should be approximately 30 ppm. The facilities that come under these regulations will be all types of operations emitting NOx, and an early enforcement will be required for those with large NOx emissions such as boilers, metal heating furnaces, petroleum heating furnaces, nitric acid manufacturing plants, NO scrubbers, cement kilns, glass furnaces, sintering furnaces, coke furnaces, and incinerators.

33496 **APTIC NO. 55692**

Ministry of Labor (Japanese Government), Bureau of Labor Standards

MEASUREMENT OF THE ATMOSPHERIC CONCENTRATION OF TOXIC SUBSTANCES IN WORK ENVIRONMENTS (ASBESTOS AND COAL TAR) REGULATED BY THE SPECIAL CHEMICAL MATERIAL HAZARD PREVENTION REGULATIONS. *(Tokutei kagaku busshitsu-to shogai yobo kisoku ni kakawaru yugai busshitsu (ishiwata oyobi korutaru) no sangyo kankyokichu nodo no sokutei ni tsuite). Text in Japanese. Aromatikkusu (Aromatics), 25(8):17-18, 1973.*

Standardized measurement methods for asbestos and coal tar were added to the July 12, 1972 government regulations on the toxic substance concentration standards in a work environment designed for the prevention of hazards by special chemical materials. By this regulation, the installation of exhaust systems which will regulate the work environment asbestos concentration to less than 2 mg/cu m is required. Taking measurements of fiber index is medically desirable. In view of the recent findings on asbestos as definite carcinogens for lung cancers and malignant tumors, the control of asbestos dusts in a work environment should be particularly strictly enforced. The standard is 5 fibers (larger than 5 micron/cu cm, which is equivalent to approximately 0.30 mg/cu m. The measurement should be taken by membrane filter or x-ray refraction. Coal tar must be measured by weight analysis. Coal tar particles are captured by glass fiber filter paper in an air sampler; the tar particles collected on the paper are extracted by benzene in a Soxhlet s extractor. Benzene is eliminated and the residue is weighed. The measurement method is further described in details. The coal tar air concentration (mg/cu m) is obtained by dividing the weight of particles by the volume of the total air taken into the air sampler (cu m).

33497 **APTIC NO. 55351**

Grundy, Richard D.

ENVIRONMENTAL POLICIES AS A CONGRESSIONAL REQUIREMENT FOR SOCIAL EFFICACY. *Environ. Affairs, 11(4):639-652, Spring 1973. 23 refs.*

The difficulties in meeting Federal and state air quality standards by 1975 are discussed. The available supplies of low-sulfur fuel and sulfur oxide control equipment cannot meet aggregate demands within the time schedules called for by the states. In most states, emission regulations were made to apply statewide, without regard to the differing air quality in regions within the state. There is the potential for Federal intervention in the establishment of end use policies. Under such controls, available low S fuels would be allocated to those critical regions where their use is necessary for compliance by 1975 with the national primary (health) air quality standards for SOx.

33498 **APTIC NO. 55616**

Hamanaka, Hironori

DETERMINATION OF ENVIRONMENTAL LIMIT FOR NITROGEN OXIDES AND FUTURE MEASURES AGAINST NOX. *(Chisso sankabutsu no kankyo kijun no settei to kongo no taisaku). Text in Japanese. Gijutsu to Kogai (Tech. Pollut.), 3(4):489-493, Sept. 1973.*

The air quality standard for nitrogen dioxide for 24 hr is 0.02 ppm in Japan. This seems very severe when compared with the U. S., U.S.S.R., and Netherlands values of 0.05, 0.042, and 0.05 ppm, respectively. In highly industrialized areas like Tokyo and Osaka, the nitrogen dioxide concentration is five times higher than the limit. Emission limits have been set for boilers, oil heaters, furnaces, and nitric acid production. The standards have been set by considering the effect of NO2 on humans, but not of the contribution of NO2 to photochemical smog. One evidence of this effect is that the rate of patients suffering from chronic bronchitis is higher in areas where NO2 concentrations are over 0.02 ppm.

33499 **APTIC NO. 55366**

Quarles, John

FERROALLOY MANUFACTURING POINT SOURCE CATEGORY. PROPOSED EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR NEW SOURCES. *Federal Register, 38(201):29008-29018, Oct. 18, 1973.*

Proposed effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources are presented. They are proposed for the open electric furnaces with wet air pollution control devices subcategory, the slag processing subcategory, the covered electric furnaces and other smelting operations with wet air pollution control devices subcategory, and the noncontact cooling water subcategory of the ferroalloys manufacturing category of point sources. Limitations on the quality or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology are given for the following: total suspended non-filterable solids, chromium, hexavalent chromium, manganese, oil, phenols, orthophosphate, pH, total cyanide, and heat content.

1972

33500 **APTIC NO. 57030**

Knez, Leo

ESTABLISHING CONCENTRATIONS OF HARMFUL GASES IN THE ATMOSPHERE. *(Ugotavljanje koncentracij skodljivih plinov v ozracju). Nova Proizvod.), 23(1):19, Jan.-Feb. 1972. Translated from Serbo- Croatian, 3p.*

Formulas for conversion between the various ways of expressing concentration of gases in the atmosphere are presented. Current data relating to maximum permissible concentration, primary toxicity level, dangerous level, very dangerous level, and immediate death level are expressed in ppm for the gases ammonia, chlorine, hydrogen chloride, carbon monoxide, carbon dioxide, nitrogen dioxide, hydrogen sulfide, and sulfur dioxide.

1970

33501 **APTIC NO. 55564**

REQUIREMENTS ON THE REDUCTION OF UNDESIRABLE VEHICLE EXHAUST COMPONENTS, AS IMPOSED BY THE TRAFFIC LICENSE ORDER OF MAY 8, 1968. *(Forderungen der Strassenverkehrs-Zulassungs-Ordnung von 8. Mai 1968 zur Verringerung der Emission unerwuenschter Bestandteile im Abgas der Kraftahrzeuge). Text in German. Staedtehygiene Uelzen/Hamburg, 21(8):184-188, Aug. 1970.*

The May 8, 1968 amendment of the German Traffic License Order concerning the limitation of the carbon monoxide and crankcase hydrocarbon emissions from vehicles equipped with spark ignition engines with a minimum stroke volume of 250 cu cm (cars) or of 800 cu m (other vehicles) is presented. The exhaust CO concentration at idling speed and acceleration is limited to 4.5% by volume, while values up to 5.5% by volume are acceptable due to the inherent errors of the measuring instruments, and for individual cases. The CO measurement should be performed with an oil temperature having reached 60 C, and with the gears in neutral or the appropiate positions corresponding to speed. The specific CO emission must not exceed 1.5 and 2.0 g/100 g of fuel for new and used engines, respectively. The corresponding limits for crankcase hydrocarbon emissions, to be measured at an oil temperature of 60 C, are 25 and 35 g/100 ml fuel. The crankcase hydrocarbon emission should not exceed 0.15% of the total fuel consumption. Positive crankcase ventilation or absence of excess pressure is required for an effective abatement of crankcase emissions.

LEGAL AND ADMINISTRATIVE

1973

33502 **APTIC NO. 55342**

Japan Chamber of Commerce and Industry, Industrial Pollution Consultation Group

A BUSINESS REPORT OF THE INDUSTRIAL CONSULTATION GROUP. (MAY 1973). *(Songyo kogai sodan shitsu jigyo hokoku sho---showa 48nen 5gatsu bun). Text in Japanese. 45p., May 1973.*

The industrial pollution consulting rooms, located at the Chambers of Commerce and Industry of 45 cities, had 682 consultations concerning pollution in May 1973. Of these consultations, 115 were related to air pollution, 138 were for water pollution, 134 for noise pollution, 13 for vibration, 24 for bad odors, one for the ground subsidence, two for soil pollution, 59 for industrial wastes, 18 for the transfer of factory, 18 for pollution preventive instruments, and 82 for others. Sixteen Chambers of Commerce and Industry held social meetings with attendance of 382 persons. A report of an investigation on industrial pollution problems was given at the Sapporo Chamber of Commerce and Industry. The present situation of pollution administration and countermeasures against it was discussed at Sendai. The pollution prevention regulations for the city of Kanazawa and enforcement rules were discussed at Kanagawa. The present situation of the control of pollution sources and countermeasures were discussed at Tokyo. The treatment of wastes produced with business activities, the outlook of the demand and supply of low-sulfur heavy oil, Fuji desulfurization equipment, the development of Higashimikawa, and pollution problems at Toyohashi were also discussed at various consultations.

33503 **APTIC NO. 55390**

EUROPE SEEKS COMMON SOLUTIONS TO PROBLEMS OF EMISSIONS AND NOISE. *Automotive Eng., 81(3):25-31, March 1973.*

A review is presented on the Organization for Economic Cooperation and Development's Oct. 1972 report entitled Automotive Air Pollution and Noise: Implications for Public Policy. Pollution problems and control measures considered include: possible restrictions on international travel due to noncompliance of an automobile with regulations in each country; health problems of airborne lead; alternatives to lead use in the form of either low-octane fuel or nonlead increased octane number; the need for uniform pollution test procedures throughout the various countries; costs of automobiles equipped with pollution control devices; problems of practical implementation of dual standards for urban and rural areas; the possibility of fees, fines, or taxation based on the measured emission level of vehicles; reduction of the number of cars in order to reduce air and noise pollution; and combinations of control techniques for cities having inadequate air circulation to disperse pollutants.

33504 **APTIC NO. 55773**

Daniels, Anders and Wilfrid Bach

PREDICTION MODELS ARE BASIS FOR RATIONAL AIR QUALITY CONTROL. *J. Environ. Health, 36(1):55-59, July/Aug. 1973. 9 refs.*

A system of meteorological diffusion, time averaging and frequency, and cost-benefit models can be used to achieve the goals of air quality control. The most feasible method for achieving the legal standards for a particular pollutant within a particular area involves the use of diffusion models to simulate the pollutant concentrations. Ambient air quality standards are set for maximums that are not to be exceeded more than once per year; in order to predict such statistics, it is necessary to determine the probability function of the concentrations. The pollutant concentration distribution is determined using the geometric mean and the geometric standard deviation. From the predicted maximum pollutant concentrations, it is possible to determine the minimum number of samplers needed, the locations where the samplers should be set up, and the minimum number of samples that must be taken to obtain representative statistics. A prediction model is needed in making decisions such as whether or not new sources of pollution can be allowed in certain areas, and a diffusion model can predict the maximum emission rates than can be permitted to meet the legal standards. A cost-benefit model determines the most economical control strategies which can be applied to stay below the pollutant levels predicted by the meteorological diffusion model. A cost-benefit analysis consists of a spatial and temporal assessment of air pollutant concentrations and a scenarium of control strategies.

33505 **APTIC NO. 55767**

Edwards, James A.

EDP: USING COMPUTERS TO EVALUATE THE FEASIBILITY OF POLLUTION CONTROL PROJECTS. *Preprint, 9p., 1973. (Presented at the International Pollution Engineering Congress, Philadelphia, Pa., Oct. 22-25, 1973.)*

The use of data processing to evaluate the feasibility of pollution control projects is reviewed and the development and application of DECIDE is described. Decision Evaluation Control Involving Doubtful Elements (DECIDE) was developed at Oak Ridge National Laboratory in an effort to provide improved means of scheduling research and development projects. Other scheduling tools as PERT and COM do not allow for planning of uncertainty. The development of a DECIDE network for air pollution control representing a 3 by 3 matrix is reviewed. A network detailing the probable route the project will follow is described. This approach also shows the time span for a project and the money that must be spent to reach that point. (Author abstract modified)

33506 **APTIC NO. 55329**

Funabashi, Nobuhisa, Koichi Haruna, and Makoto Shioya

AIR POLLUTION CONTROL: ITS STRUCTURE. *(Taiki osen no seigyo kozo). Text in Japanese. Preprint, Japan Society of Air Pollution, p. 298, 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 49.)*

Air pollution can be segmented into three levels: the social structure which emits pollutants; the physical mechanism which changes the emitted material by dispersion, diffusion, and chemical changes; and the mechanism of dispersed and changed material affecting the human body and human properties. At the present time, the most immediate approach is the clarification of time mechanism and the bondage between these elements. Sulfur oxides control, for instance, depends on the information obtained, and the time required between the obtaining of information and control could vary between one or two hours to five years, if it is a matter of moving the emission sources or developing pollution free equipment. Therefore, the control method must take this time requirement and the scale of control into consideration when determining the speed and amount of information obtained. Information on the possibility of forecasting and control is prerequisite for pollution control. With various types of pollution, prediction is almost possible with industries, partially possible for the general urban type pollution, and almost impossible for the suburbia type pollution.

33507 **APTIC NO. 55338**

Hirose, Moriyuki, Ko Horie, Masatake Murahashi, Takashi Yajima, Yukihisa Tamura, and Katsutoshi Ota

AN INVESTIGATION OF ROAD AND CITY ENVIRONMENT. *(Doro to toshi kankyo ni kansuru chosa kenkyu). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 68-78, 1973. (Presented at the Symposium on Environmental Problems and Civil Engineering Planning, 7th, Tokyo, Japan, Aug. 20-30, 1973.)*

Roads were studied from the standpoint of city environment, by evaluating the road and roadside environment, by studying automobile exhaust pollution, and by studying traffic. A multiobjective analysis was used which consisted of the establishment of objectives and of an evaluating measure, the establishment of an alternative plan, the decision of a beneficial modification curve, the decision of a social beneficial indiscriminate curve, and the choice of an alternative plan. Noise, exhaust, and sunshine must be evaluated at different distances from the road.

33508 **APTIC NO. 55439**

Jenkins, Robert E. and W. Brian Bedford

THE USE OF NATURAL AREAS TO ESTABLISH ENVIRONMENTAL BASELINES. *Biol. Conserv., 5(3):168-174, July 1973. 35 refs.*

The need for the use of natural areas to establish environmental baselines and preserve environmental quality is discussed. In order that wise decisions can be made in environmental management, an understanding is needed of ecosystem functioning and reaction to change. To obtain this information a continuing knowledge of the undisturbed ecosystem as a baseline against which to measure the effects of modifications is needed. Relatively undisturbed natural areas should form the basic research tool for the establishment of such baselines. There is a need for a comprehensive natural area system to preserve, manage, and catalogue for use the full range of natural area types. This, together with a network of environmental monitoring stations, should lead to the long term continuation of the many baseline measurements required for necessary ecosystem analysis programs. It is expected that such a system of natural area/baseline programs will lead away from the narrow focus on pollution and towards an integrated approach to environmental quality and management. (Author abstract modified)

33509 **APTIC NO. 55765**

Jordan, James K.

ORGANIZATIONAL STRUCTURE FOR SOUND REVIEW IN THE CAPITAL AUTHORIZATION PROCESS. *Preprint, 6p., 1973. (Presented at the International Pollution Engineering Congress, Philadelphia, Pa., Oct. 22-25, 1973.)*

The capital authorization process for pollution control is reviewed. The main point to consider is whether the project for which the capital funds are requested will result in an acceptable rate of return on the investment. Additional criteria include: compliance with government established control standards, interpretation of the requirements, how the suggested equipment or process will meet these standards, and the pollution-causing potential of the equipment and processes to be used. The size of the company is the single most important factor in determining the organization of the authorization process. Thy organization of the authorization process is outlined for General Electric and for a medium-sized and small-sized company.

33510 **APTIC NO. 55400**

Kimura, Koh, Hisashi Yasunaga, and Shuhei Aida

AIR POLLUTION MONITORING SYSTEM. *(Taiki osen no keisoku to seigyo). Text in Japanese. Denki Tsushin Daigaku Gakuho (Rep. Univ. Electro. Commun.), p. 149-175, Aug. 1973. 29 refs.*

To protect persons living under conditions of environmental pollution, various local governments are planning projects such as continuous monitoring systems for environmental hazards; these systems make use of electronics, data processing, and other techniques. However, these systems present many as yet unsolved problems. A new concept for continuous monitoring systems is introduced, with primary consideration being given the air pollution control center in Osaka. The new model system, called the Environmental Pollution Unit (EPU), identifies, estimates, and controls the adaptive minimum area necessary for monitoring, predicting, and controlling the air pollutants. The EPU utilizes data communication networks and computer systems, and can be used to determine the environmental capacity.

33511 **APTIC NO. 55728**

Kojima, Shigeyoshi, Yasuyuki Noda, Makoto Fujii, Masashi Kokubu, and Akio Inoue

INTEGRATED POLLUTION MONITORING AND SURVEILLANCE SYSTEM. *Kogai sogo kanshi shisutemu). Text in Japanese. Toshiba rebyu (Toshiba Rev.), 28(7):719-724, July 1973. 4 refs.*

The need for an integrated pollution monitoring and surveillance system, and the function and structure of such system are discussed. The functions of an integrated pollution monitoring and surveillance system are: regulating and processing collected data, evaluation of data in the light of standards, and giving out instructions for emergency treatment. In the area of prediction, a quick and accurate forecasting is necessary; various processed data should be organized into periodical and daily charts and sent back to each monitoring station. Pollution conditions and forecasting should be indicated on monitoring indicator boards. Emergency instructions should be given by simultaneous communication systems, and the confirmation of emergency operations should be received from each emission source. Pollution conditions, forecasting, and emergencies should be announced to the general public by street sign boards (automatic) or through mass communication media. Registration by emission sources, of complaints, appeals, investigation results, and other helpful information should be collected, organized, and kept, and pollution and administrative information should be filed in the data bank. The hierarchical structure of information collection and handling, and the hardware system based on the basic policy are presented.

33512 **APTIC NO. 55763**

Tobin, Maurice B.

THE ACQUISITION OF THE FEDERAL ENVIRONMENTAL CONTROL RESEARCH AND DEVELOPMENT DOLLAR. *Preprint, 4p., 1973. (Presented at the International Pollution Engineering Congress, Philadelphia, Pa., Oct. 22-25, 1973.)*

The acquisition of the Federal environmental control research and development dollar is reviewed. Environmental Protection Agency (EPA) contracts for research and development work may cover as much as 100% of the cost of a project. The conditions that are most likely to make a project eligible for EPA funds are outlined. There are a number of other government agencies that may be interested enough to help with the financing. One example is followed through eight different agencies. (Author abstract modified)

33513 **APTIC NO. 55365**

Train, Russell E.

MOTOR VEHICLE POLLUTION CONTROL. CALIFORNIA STATE STANDARDS. *Federal Register, 38(210):3016, Nov. 1, 1973.*

The action taken by the Administrator of the Environmental Protection Agency on a request from California to waive the application of a section of the Clean Air Amendments of 1970 is presented. The request for waiver of Section 209(a) with respect to California's proposed standards of 0.9 g/mi hydrocarbons, 17 g/mi carbon monoxide, and 1.5 g/mi nitrogen oxides is denied. Application of Section 209(a) to California with respect to 2 g/mi hydrocarbons, 20 g/mi CO, and 2 g/mi NOx for model year 1975 light duty trucks is waived if California adopts such standards. Application of Section 209(a) to California with respect to 0.9 g/mi hydrocarbons, 17 g/mi CO, and 2 g/mi NOx for model year 1976 light duty trucks is waived if California adopts such standards.

1972

33514 **APTIC NO. 55682**

Dreyhaupt, Franz-Josef

PROBLEMS OF SETTLEMENT RESEARCH. *(Probleme der Siedlungsordnung). Text in German. Erdoel Kohle (Hamburg), 25(12):731-734, Dec. 1972. 15 refs.*

Practical examples are given to illustrate the problem of defining industrial and residential areas immediately neighboring upon one another in relation to industrial emissions of air pollutants. The determination of sufficient protective distances between residential and industrial areas is presented as the solution. Protective zones up to 2000 m width are to be expected in the sector of the mineral oil industry. The observation of protective zones which can be realized necessitates acceptance by the population of air quality standards not excluding any kind of impairment through emissions and substantial improvement of the present technology by industry for reduction of emissions.

1971

33515 **APTIC NO. 55498**

WAR ON AIR POLLUTION IN BELGIUM. *(Lutte contre la pollution atmospherique en Belgique). Text in French. Tribune CEBEDEAU (Centre Belge Etude Soc. Eaux), 24(337):569-570, Dec. 1971.*

Royal decrees issued in Belgium in 1971 concerning the creation of special protection zones and the limitation of the carbon monoxide emission from internal combustion engines are presented. Special protection zones have been designated in residential areas on the basis of systematic sulfur dioxide measurements wherever such measurements revealed SO2 concentraions as annual means in excess of 150 mg/cu m. In such special protection areas, the use of peat, lignite, non-degassed agglomerated products, and waste materials for domestic heating is prohibited. Other liquid and solid fuel may contain a maximum sulfur content of 1%. Stacks and chimneys should be designed to avoid the formation of local pollution. The carbon monoxide content in motor vehicle exhaust gases at idle is limited to 4.5%, while a higher value of 5.5% will be tolerated until Oct. 1, 1972.

33516 **APTIC NO. 55541**

Carpenter, Richard A.

EXPECTATIONS OF THE DECISION MAKER. *In: Man s Impact on the Climate. William H. Matthews, William W. Kellogg, and G. D. Robinson (eds.), Cambridge, Mass., MIT Press, 1971, Chapt. 45, p. 533-536.*

The following expectations of societal leaders are discussed: that SCEP will order the critical problems of the global environment as to priority; that substantial uncertainties exist; that many problems can neither be dismissed nor given high priority on the basis of present knowledge; that a listing or alternative responses to the problems should be available, and that the motivations of human beings which constrict the implementation of decisions can be recognized. The decision maker can be greatly helped by the purposeful seeking out of those facts and interpretations that strengthen the implementation of desired courses of action by enlisting human nature.

33517 **APTIC NO. 55554**

Chaddock, R. E.

CORPORATE RESPONSIBILITIES AND OBJECTIVES IN POLLUTION CONTROL. *Rainbow, 7(1):1-7, Summer 1971. (Presented at the Dry Color Manufacturers Assoc., Annual Meeting, Summit, N. J., June 21, 1971.)*

A study was made to determine what various companies are doing about their corporate responsibilities and objectives in pollution control. A survey of 175 firms indicated that the majority of companies have given increased emphasis to pollution control by establishing a special corporate unit to deal with the problem or by assigning the problem as a major responsibility to an existing corporate function. The survey also indicated that most of the companies foresee increased emphasis on pollution control at the corporate level as a future trend. Some plan to enlarge their pollution control activities and to extend the scope beyond air and water. (Author conclusions modified)

33518 **APTIC NO. 55552**

Dhillon, N. Singh

UTILIZATION OF AUTOMATIC DATA PROCESSING AND RADIO COMMUNICATIONS IN ENVIRONMENTAL PROGRAMS. *Preprint, Conference of Local Environmental Health Administrators and the Environmental Section, 19p., 1971. (Presented at the American Public Health Association, Annual Meeting, 99th, Minneapolis, Minn., Oct. 14, 1971.)*

The Environmental Health Division of Maryland s Anne Arundel County Health Department is operating successfully using an Electronic Data Processing system with ratio communication. This system provides the Environmental Health director and others with the information needed to more effectively use their resources, to gauge their activities and to provide the necessary services to the citizens. Sanitarian s logs are used to prepare Input Control reports and weekly Sanitarian Reports. Monthly reports include: a Monthly Establishment Report, which shows how many times a particular establishment was visited per month and how much time was spent there; a Coordinate Report, which shows how much activity has taken place in each area; and an Activity Report, which allows comparisons of hours, number of calls, average time per call, standard time per call, and difference between actual and standard for each type of service and each sanitarian. A Quarterly Activity Report is also prepared, along with a quarterly Evaluation Trend Report, which compares desired services to actual service. An Evaluation Trend type of report is also generated semi-annually and annually. The cost of the Anne Arundel County Program has been reasonable: $900 is spent per month on radio communication; $54 is paid monthly to the telephone company; the cost of writing the computer program totaled $2000; and only $3500 was spent last year for operation. Investigation of air pollution problems in community health, and examination of abatement legislation are two services provided by the system.

33519 **APTIC NO. 55560**

Nerot, Georges

REPORT SUBMITTED BY C.I.T.E.P.A. TO THE MINISTER. *(Presentation de C.I.T.E.P.A. a Monsieur le Ministre). Text in French. Pollut. Atmos. (Paris), [illegible] special):74-76, Oct. 1971.*

General problems and the form of organization of the war on air pollution in France are outlined. The A.P.P.A. (Association pour la Prevention de la Pollution Atmospherique Association for Air Pollution Prevention), founded in 1962, is engaged in global air pollution studies in all areas, especially with regard to public health aspects information and education campaigns. It organizes air pollution measurements, and studies on the effects of air pollution on humans animals, plants, and materials. Another organization, C.I.T.E.P.A. (Centre Interprofessionnel Technique d Etudes del a Pollution Atmospherique), sponsored mostly by the coal and petroleum industries, was created in 1961 to promote air pollution-related research and documentation, and to propose air pollution control measures to the legislation.

SOCIAL ASPECTS

1972

33520 **APTIC NO. 55411**

Calhoun, John B.

MAN OF THE ENVIRONMENT. *J. Environ. Health, 35(3):236-247, Nov./Dec., 1972. 3 refs.*

A discussion of man and his awareness of the environment in connection with the National Environmental Policy Act is presented. The time course of effort on environmental control is graphically depicted in terms of years and percent of total effort and indicates that initially the focus on control of pollution will require the greatest percent of our effort. Approximately 75% of the total effort toward environmental control will be required for pollution control between the years 1970 and 1985. Expanding awareness and community are seen as the ultimate goal in repairing and promoting the environment. A strategy for evaluating the environment is presented, and levels of human needs modified by the environment are mentioned.

GENERAL

1971

33521 **APTIC NO. 55559**

Armand, Louis

CONCLUSIONS. *(Conclusions). Text in French. Pollut. Atmos. (Paris), 13(no. special):77-78, Oct. 1971.*

State-of-the-art, and general problems and possibilities in air pollution abatement in France are outlined. Adequate technical solutions, even though often expensive, are available for efficient air pollution control in the industries. Public information and education in air pollution problems, nationwide air pollution monitoring systems, and the elaboration of air pollution standards will be necessary as basic elements in the continued efforts to control air pollution.

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